THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Positive developments in the iron trade have been lacking in the opening week of 1904. The hopeful feeling with which the new year had been looked forward to after the discouraging experience of the last three months of 1903 is still abroad, but business has not yet really begun. A number of mills have started on orders accumulated in recent shut-downs, and some blast furnace resumptions are reported in the Pittsburg and Valley districts. These were expected after the drastic curtailment that began in October; and now that the agreement under which Central Western furnaces restricted output has expired, there are likely to be some further additions to the active list. There might well be, unless the merchant furnaces are to be eliminated as a factor, as was almost the case 10 days ago, when only four out of 21 furnaces in the Bessemer association were in operation. The pig iron situation naturally has attracted most attention. In respect to Southern iron it may be summed up in the statement that whereas a few weeks ago business improved at the expense of prices, there is now an improvement in prices at the expense of business. It may require a little time to know on what basis further buying of Southern iron will take place. The quotation of $10 at furnace for No. 2 iron is more general, and some business has been done at $9.75. The meeting of producers at Birmingham last week adjourned without definite action beyond the appointment of a committee to consider whether any plan of cooperation is feasible. The market does not appear solicitous as to the outcome. Northern irons are now sold in the Central West at figures that will steadily take business if the Southern furnaces continue to ask $10 at furnace. Eastern furnaces are slower to meet Southern competition and sufficient business has not developed to show how low they are willing to go, with their coke $2 a ton below the contract price of last year.

Two events of the week have served as illustrations of the contrast between the opening of 1904 and the beginning of 1903—the passing of the dividend on the common stock of the United States Steel Corporation and the appointment of receivers for the Clairton Steel Co. The former was the happening of the expected and the latter was a natural consequence of things well known. The conditions back of both forbid enthusiastic prophecy concerning the profits of 1904 in iron and steel. The prospect for new business in finished material is being discussed with interest now that the long-awaited time for buying has come. How consumers regard the reaffirmed prices in billets and in certain finished forms is not yet clear, and the query with buyers is whether the reaffirmation means confidence in the appearance of tonnage at these figures or amounts to a declaration that there is not sufficient evidence of buying to warrant naming a new price. Products on which there is no agreement are weaker under recent competition for the business offered. In bar iron a new record has been made on Central Western business, 1.25c at the mill being shaded. Independent sheet manufacturers have been more active since the reduction in wages and the raising of the limit of output, which amounts to that much of an addition to capacity. Business has been somewhat more active at the lower prices. Chicago reports a better market for plates and the closing of 20,000 tons by the local mill. In the same district two buildings have been let that call for 4,000 tons of structural steel. An additional order for 1,500 cars is also noted. The wire trade gives good indications for the first week of the year, and there is evidence that the independent interests in the Pittsburg and Ashland districts are maintaining the prices recently named by the leading interest. Prospects for wire goods are favorable, and the finer steel products may show a better movement in the early part of the year than the heavier, the farming community being a better dependence at the moment than the railroads.

The effort of rail re-rolling companies to bring about a better condition in the light rail trade has gone as far as an appointment for a meeting at Pittsburg, Jan. 14.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Jan. 6.

Pig iron has not shown any increased strength in the first business week of the new year, unless the fact that nearly all the Southern producers which had not advanced their asking price to $10 have now done so. No iron has sold locally on the $10 basis and from the attitude of consumers there is no immediate prospect that there will be.

Demand has picked up materially for finished steel products, and consists of small scattered orders rather than any large contracts. Structural shapes in particular are in better demand. Plates are improved but there is still no important demand from steel car builders.

The understanding which appeared to have been reached between the steel corporation and the Pittsburg Steel Co., as noted in previous reports, seems now to have been extended to include the only other plain wire and nail producer of any consequence, the Ashland interest. Wire nails are firm at $1.85, base, Pittsburg, for ordinary jobbers' carloads. There is some expectation in the trade of an advance this month.

A call has just been issued for the meeting of light rail mills, referred to in previous reports. It will be held in Pittsburg, Thursday, Jan. 14. Letters have been received from about all the mills expressing sympathy with the movement to get together and promising support.

There was some surprise in the trade at the turn Crucible-Clairton affairs took in the sudden application for receivers Monday evening. While developments were expected, few even of those directly interested in the company knew anything of the receivership matter until the application was actually made. The receivership is more or less a matter of bookkeeping between the companies, to give the Crucible company a priority over ordinary accounts, for the money it is well known must be advanced to maintain Clairton's position. A light principal payment of $100,000 on the bonds has already been met this month, Crucible advancing part of the money, and a heavier payment of $500,000 is due next July, besides which there are interest payments right along. Crucible has no priority on the money already advanced, and a plan is under advisement to secure it. Against future advances it will receive receivers' certificates. The involvement does not stop at the principal and interest of the $10,250,000 bonds outstanding against the Clairton company, which were guaranteed in the indenture by the Crucible company, but includes also that part of the indebtedness against construction account and purchases which was not covered by the bonds nor the small collateral trust loan negotiated

last October among friends of the company, besides which it is stated additional working capital is required. The most interesting developments in the matter are probably yet to come, as the last annual report of the Crucible Steel company showed that on Aug. 31 there was about $500,000 excess of accounts and bills payable over accounts and bills receivable, with $708,685 cash, and $437,500 preferred dividend already declared. The following dividend has been passed. It was understood when the collateral trust loan was floated last October, following the failure of negotiations with the steel corporation, that the collateral pledged included not only the Clairton stock but also stocks of important Crucible subsidiaries, of which the plants were not owned by the Crucible company in fee.

The trade is reassured by the announcement that yesterday afternoon the steel corporation declared the full preferred dividend. The passing of the common dividend was fully expected.

Pig Iron.—The movement has been light, but there is a fair inquiry. Consumers are not disposed to be anxious about placing contracts, and are placing orders even for early delivery in a modest way, not being convinced that prices are fully down to the level dictated by the new basis on coke and wages and the anticipated reduction in ore. The most important transaction was the purchase of 1,000 tons of forge by a Pittsburg district iron mill for early delivery at about $12.75, delivered. Bessemer is extremely quiet. Some furnaces are holding No. 2 foundry at $14.25, Pittsburg, but $14 is easily shaded in a number of directions, particularly in the valleys, where the merchant furnaces are feeling keenly the decreased consumption of Bessemer and basic. There is scarcely a Southern furnace interest now which will shade $10, Birmingham, but no one appears interested in this market more than to wonder what the next move of the furnaces will be. Consumers are unlikely to make any move themselves. Several furnaces are blowing in now as they are relieved of their old high priced coke contracts. Low phosphorus pig is a little lower yet, as the interest which started some time ago to take all the business in sight finds slightly lower prices to meet, and it is reported that $18, Pittsburg, can be shaded. There is a report that this leading interest proposes to make foundry iron, and an independent steel interest in the Ohio valley, which has picked up quite a lot of melting stock lately on favorable terms, is mentioned in the same connection. We revise quotations as follows:

Bessemer, Valley	$13 25 to 13 50
Bessemer, Pittsburg	14 10 to 14 35
No. 1 Foundry	14 25 to 14 50
No. 2 Foundry	13 75 to 14 25
Gray Forge, Pittsburg	12 75 to 13 00
Chilled Basic, Valley	12 90 to 13 25
Chilled Basic, Pittsburg	13 75 to 14 10

Steel.—There is scarcely anything doing in steel, but on ordinary lots the association figures represent the market. Occasionally an odd lot of open-hearth is offered by a broker at a concession, it having been taken in exchange for pig. Regular quotations are: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30, Pittsburg.

Ferro-Manganese.—The market is a little weaker, and the leading interest is reported to be meeting all quotations. We now quote carloads, delivered east of the Mississippi river at $46, while on large lots, for early shipment, the price is made still more attractive.

Muck Bar.—The market remains quiet, and the regular mill quotation of $25, delivered Pittsburg, could be shaded by at least 50 cents a ton on a nice inquiry.

Skelp.—The skelp market is not over-strong, in consonance with the lowering of the official basis on pipe. It is understood the new pipe basis is figured on skelp at about 1.50c. Steel skelp is weaker than iron, sheared iron being fairly stiff. We quote: Steel skelp, grooved, 1.40c; sheared, 1.45c; iron skelp, grooved, 1.45c to 1.50c; sheared, 1.50c to 1.55c.

Rails and Track Material.—The rail re-rolling mills will hold a meeting in Pittsburg Jan. 14, in accordance with a call issued last night by A. F. Baumgarten, of the Union Rail Co. There are assurances from six or seven of the eight mills in the country that they will be represented. The mills which re-roll old rails into rails are: Union Rail Co., Huntington, W. Va.; the Atlanta Steel Hoop Co.; Cambridge (O.) Rolling Mill Co.; Maryland Rail Co., Cumberland, Md.; Schonthal Iron & Steel Co., Cumberland, Md.; Clearfield (Pa.) Iron & Steel Co.; Fairmont (W. Va.) Steel Co., and Buffalo (N. Y.) Steel Co. The Huntington plant has not yet been put in operation, the work of changing it from a sheet mill being just now about finished. It was purchased by Mr. Baumgarten, of the Union Rail Co., from the Huntington Tin & Planished Plate Co. One of the objects of getting together is the saving of freights, which would be quite an important item considering how much the mills themselves are scattered, and over what a large territory they do business, both in buying old rails and in selling their product. There have been a great many cross shipments. It is regarded as feasible to attempt to firm up the market, as light rails are now several dollars a ton below standard sections, while in times of active demand they have been far above. We quote as follows: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 and 20 pounds, $26.50 to $27; 25 to 40 pounds, $25 to $25.50. Track material: Spikes, 1.95c to 2c; track bolts, square nuts, 2.25c to 2.30c; hexagon nuts, 2.40c to 2.45c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 1.80c to 1.85c is asked.

Plates.—There is a decidedly good lot of scattered orders, but no contracts of importance. The mills profess a more comfortable feeling since the first of the year. We make the following quotations: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16-inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—Orders for small lots of structural material have been coming in pretty freely since the first of the year, but no large contracts, nor are any being figured on. It is expected, however, that some large construction work will materialize in due season. Quotations are unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Bars.—There is a fair run of current business. While some leading mills are quoting openly 1.30c, Youngstown, on all inquiries for bar iron, there is no difficulty in doing 1.25c even on carloads, if the specifications are reasonably satisfactory. It is understood that in districts farther west this has been shaded on recent competition. We quote as follows: Bessemer steel bars, 1.30c; open-hearth, 1.40c; plow beams and cultivator beams, 1.30c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.40c; common bar iron, 1.30c to 1.35c, Pittsburg. The following differentials are emaintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops are quoted at 1.65c, full extras, in 250-ton lots and over, and 1.75c in less than 250-ton lots. Bands are quoted at 1.30c and take the bar extras.

Sheets.—The independents are making much more of a bid for trade since they were assured of lower wages. There is active canvassing for business, but there is no

possibility of enough being found to keep mills even moderately well employed, especially since the large increase in the limit has practically enlarged the industry's capacity. On mill carloads with fairly good specifications it is possible to shade official prices by 5 cents a hundred, and a few very large buyers seem to be getting an extra 5 cents. On galvanized it is possible to do an extra 2½ percent on good business beyond the 80 percent generally quoted. Black sheets in 500-bundle lots and over are held as follows: No. 30, 2.75c; No. 29, 2.65c; No. 28, 2.35c to 2.40c; No. 27, 2.25c to 2.30c; Nos. 25 and 26, 2.20c to 2.25c; Nos. 22 and 24, 2.15c to 2.20c; Nos. 18 and 20, 2.10c to 2.15c; Nos. 14 and 16, 2.05c; Nos. 10 and 12, 1.75 to 1.80c. Galvanized, Nos. 10 to 17, 2.40c to 2.45c; No. 17 to 22, 2.60c to 2.65; Nos. 22 to 25, 2.80c to 2.85c; Nos. 25 and 26, 3c to 3.05c; No. 27, 3.20c to 3.25c; No. 28, 3.40c to 3.45c; No. 29, 3.80c to 3.85c; No. 30, 4.30c.

Pipes and Tubes.—Demand has shifted according to the season but mills are in receipt of a fair amount of business. The new steel pipe discounts are being adhered to all around. On iron pipe there are slight and well regulated concessions. The change in official discounts, amounting to 3 points on half-inch, and 2 points on other sizes, means net reductions from the old official list of from 5 to 10 percent, and figures out an average of about $4 a net ton. The revised discounts in carload lots to consumers, f. o. b., Pittsburg, plus freight to destination according to Tube Rate Book are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	70	60	67	57
½ inch	73	63	70	60
¾ to 6 inch	77	67	74	64
7 to 12 inch	71	61	68	58

EXRTA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	69	59	65	55

DOUBLE EXTRA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	61	51	57	47

BOILER TUBES.

	Steel.	Iron.
1 to 1½ inch	42½	39
1¾ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 13 inch	55½	38

Wire and Wire Nails.—Concessions from the Pittsburg basis for Western shipments have been withdrawn by the leading producer and the Pittsburg interest, which, as already noted, has been working in close harmony for about three weeks, and now it appears the Ashland interest has been taken into the understanding, so that the whole market is firm on the Pittsburg basis. On jobbers' carloads the market is $1.85 on nails and $1.75 on plain wire, and this price is applicable to pretty nearly all fairly large buyers. A slight special concession is made to a few of the recognized very large jobbers. The wire trade has gotten into very satisfactory shape. The mills are well filled up for some time to come, and the trade is talking about the possibilities of an advance before the month is over. We quote as follows: Wire nails, carload lots, to jobbers, f. o. b. cars Pittsburg, $1.85 to $1.90; plain wire, carload lots, $1.75 to $1.80; barb wire, carload lots, $2.15 to $2.20; staples, carload lots, $2.05 to $2.10. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $1.90, and less than carload lots, $1.95, f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $1.90 in carload lots and $1.95 in less than carload lots. Terms, 60 days less 2 percent off in 10 days.

Merchant Steel.—There is nothing new in this line, trade being quiet. We make the following quotations: Turned cold rolled and ground shafting, 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.70c to 1.80c; spring steel, 2.15c to 2.20c; toe calk, 2.15c to 2.20c. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—Dealers are out endeavoring to make contracts with mills for their output for the next few months. There is considerable discussion as to price, since the market has had such a drop that there is confusion. Here and there is an inquiry from consumers, but they are not taking much interest in the market yet. Dealers expect to shade $11 in buying heavy melting stock, while the regular asking price is $11 to $11.50. On sheet scrap $7 is offered but mills are disinclined to dispose of their output on this basis. Cast scrap is quiet. Rerollers and relayers are not commanding much premium over old rails, which are $11 to $11.50. Low phosphorus scrap is in very light demand, and holders are simply naming prices at $13.50 to $14.50 and waiting for the demand.

Coke.—There has been a fair amount of coke contracting by furnaces, and the market is pretty steady. On foundry coke there is quite a range of figures. We quote standard Connellsville furnace coke on contract at $1.75 to $1.85, while ordinary Connellsville grades are selling at $1.60 to $1.70. Klondike coke is $1.40 to $1.45 and on main line it is understood $1.40 has been shaded slightly. On foundry coke prices all the way from $2.00 to $2.40 are quoted, according to grade.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Jan. 5.

The first week of the new year is one of promise for the iron and steel industry. Trade sentiment is better, pig iron prices are firmer and orders more numerous than for some time. With the holiday season out of the way and buyers settled down after the confusion of inventory period, a still greater improvement is looked for. All products have shared in the activity of the past week, though some have benefited to a greater extent than others. Pig iron in particular has been active, the increase being attributed largely to the advance in prices which several Southern producers announced would go into effect Jan. 1. Most Southern furnaces are now holding their product at $10 Birmingham for No. 2 foundry, sales being restricted to deliveries within the first quarter and to lots not over 500 tons each. Northern irons are unchanged, though some sellers favor an increase on account of the advance in Southern pig. There has been a brisk demand for plates during the week, contracts for 20,000 tons having been closed by one producer. Structural steel has also had some movement, the contracts for two local buildings requiring about 4,000 tons of shapes having been let a few days ago. Bar iron is quiet and prices are unchanged at 1.30c. Soft steel bars are also without noticeable activity. Mills have not yet benefited to any appreciable extent by the orders for new rolling stock placed by railroads during December, though a marked increase in specifications from these sources is looked for in the next few weeks. During the week railroads have let orders for 1,500 cars on addition to those noted in our last report. Rail mills report that specifications for heavy sections are quiet, though light rails are in brisk demand, as also are track supplies. The demand for wire products has improved following the cut of $3 a ton announced last week, a number of jobbers having placed orders for their spring stocks. The leading producer of merchant pipe announces about 10 percent greater discounts on both black and galvanized pipe, the lower prices going into effect Jan. 1. Scrap is quiet, mills buying only as their needs determine. Light agricultural cast and stove plate are scarce, and prices on these grades are firm. Coke is moving fairly well, 72-hour Connellsville foundry coke being held from $2.25 to $2.50, while Southern grades are generally quoted from $2 to $2.25 at the ovens.

Pig Iron.—Trading during the week has been marked by a briskness not seen for some time past. None of the

contracts negotiated were for large amounts, few exceeding 500 tons; but the aggregate tonnage was of very good proportions. Most of the orders called for Nos. 1 and 2 soft and foundry and were taken by Southern furnaces, though there was some buying of malleable, basic and gray forge irons. Southern iron is now generally held at $10 Birmingham for No. 2 foundry, those producers who had been selling at lower prices advancing their quotations Jan. 1. A number of the furnaces below the Ohio river have withdrawn from the market for the first quarter, while those that are still selling iron are limiting transactions to lots not exceeding 500 tons, deliveries on the whole of which must be made before March 31. In Nothern irons no change in prices has yet been made. We quote as follows:

Lake Superior Charcoal	$16 50 to 17 00
Northern Coke Foundry No. 1	15 00 to 15 50
Northern Coke Foundry No. 2	14 50 to 15 00
Northern Coke Foundry No. 3	14 00 to 14 50
Northern Scotch Foundry No. 1	15 50 to 16 00
Ohio Strong Softeners No. 1	16 80 to 17 30
Ohio Strong Softeners No. 2	16 30 to 16 80
Southern Coke Foundry No. 1	14 35
Southern Coke Foundry No. 2	13 85
Southern Coke Foundry No. 3	13 35
Southern Coke Foundry No. 4	12 85
Southern Gray Forge	12 60
Southern Mottled	12 35
Southern Silveries (4% to 6% Silicon)	16 50 to 17 50
Jackson Co. Silveries (8% to 10% Silicon)	18 50 to 19 50
Alabama and Georgia Car Wheel	19 85 to 20 85
Malleable Bessemer	14 50 to 15 00
Basic Iron	14 35 to 14 85

Iron and Steel Bars.—The holiday season is blamed for the light tonnage taken and a marked improvement is looked for when the new year gets a little older. Railroads are buying cars, having placed orders for 1,500 during the past week, and mills expect to benefit by this activity within a short time. Prices are without change, and we quote bar iron, 1.30c to 1.35c Chicago, carload lots, mill shipments, half extras. Soft steel bars are 1.46½c, half extras, Chicago delivery, carload lots, mill shipments, with 5c to 10c extra for less than carload lots; angles, less than 3 x 3, 1.56½c base, half extras; hoops, 1.81½c carload lots, full extras. Jobbers' quotations on carload lots and less: Iron, 1.50c to 1.60c, base full extras; steel, 1.60c to 1.70c; small angles, channels and tees, less than 3 x 3, 1.70c to 1.80c; hoops, 2.10c rates, full extras.

Billets.—The market is without animation, the demand being limited to small lots for forging purposes. We quote the official schedule of $24 Chicago, for carload lots of open-hearth or Bessemer, for rolling or forging.

Sheets.—There is little improvement to be noted in mill business, though store trade is brisk. Keen competition exists and the cutting of prices goes on. We quote black sheets, carload lots, mill shipments: No. 27 gauge, 2.41½c to 2.46½c; No. 28, 2.46½c to 2.51½c; galvanized from mill 80 and 2½ percent off. Store prices are without essential change, and we quote as follows: No. 16, 2.45c; Nos. 18 and 20, 2.55c; Nos. 22 and 24, 2.60c; No. 26, 2.70c; No. 27, 2.80c; No. 28, 2.90c; galvanized from store 75 and 7½ percent.

Plates.—There has been a marked improvement in new business during the week, contracts having been closed by the local producer aggregating 20,000 tons. Specifications also are on the increase, and the outloook is brighter than for months. We have changed our prices in accordance with the new schedule, based on Pittsburg, which went into effect Jan. 1, and quote mill shipments, Chicago delivery, as follows: Tank steel, ¼-inch and heavier, 1.76½c; flange steel, 1.86½c. From store, we quote on small lots: Tank steel, ¼-inch and heavier, 1.90c to 2c; 3-16, 2c to 2.10c; No. 8, 2.10c to 2.20c; No. 10, 2.15c to 2.35c; flange steel, 2.25c, all f. o. b. warehouse.

Structural Steel.—The American Bridge Co. secured the contracts during the week for the steel work on two local buildings, the requirements of which will call for about 4,000 tons of steel shapes. There is a good outlook for the building trade in this city, and a number of fair sized jobs are being figured on. Specifications on contracts are of fair proportions. Prices are without change, and we quote mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.76½c; tees, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 1.90c rates; 18, 20 and 24-inch, 10c extra; tees, 1.95c rates.

Merchant Steel.—Several contracts for season requirements have been let during the week, the aggregate tonnage being of fair proportions. Prices are without change, and we quote mill prices, Chicago delivery: Spring steel, 2c; sleigh shoe, flat sizes, 1.60c; concave and convex, 1.75c; cutter shoe, 2.25c to 2.30c; smooth finished machinery steel, 1.71½c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.01½c to 2.11½c. Ordinary grades of tool steel, 6c to 8c; specials, 12c and upwards. Cold rolled shafting in carload lots, 52, and in less than carload lots, 47 percent discount from list.

Merchant Pipe.—The leading producer announces a change in its discounts, making a reduction in net prices of about 10 percent, same going into effect Jan. 1. Demand is quiet at present, though the spring trade is expected to open up shortly. We have revised our prices and quote to consumers, carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ⅜ inch, inclusive	68.35	58.35	65.35	55.35
½ inch	71.35	61.35	68.35	58.35
¾ to 6 inch	75.35	65.35	72.35	62.35
7 to 12 inch	69.35	59.35	66.35	56.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—The change in prices announced last week has resulted in an improved demand, the inquiry coming from both consumers and jobbers. We quote carload lots, mill shipments, Chicago delivery, as follows:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	42.35	39.85	53.35
1¾ to 2¼ inch	54.85	37.35	40.35
2½ inch	57.35	42.35	.....
2¾ to 5 inch	63.35	49.85	} Up to 4 inches.
6 to 13 inch	54.85	37.35	} 48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	35	37.50
1¾ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	} Up to 4 inches.
6 to 13 inch	50	32.50	} 45

Rails and Track Supplies.—Light sections predominate in the demand on rail mills, and orders for these have been fairly numerous. Heavy rails are quiet. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; 25-pound rails, $25 to $27; 12-pound rails, $26 to $28, with regular differentials for intermediate sizes. Track supplies, mill shipments, angle bars, 1.60c to 1.70c; spikes, first quality, 1.75c to 1.85c (out of store, 2.10c to 2.20c rates); second quality, 1.45c to 1.55c; track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds (from store, 2.80c to 2.90c); with hexagon nuts, 2.55 to 2.65c (from store 3c), with usual differentials for other sizes.

Wire Products.—There has been a liberal amount of buying following the reduction of $3 a ton announced last week. A number of leading dealers and jobbers have placed orders for spring stocks, and the total tonnage has been of larger proportions than for several weeks past. We quote prices to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.00; cut nails, steel, carload lots, $2.06½; plain wire, $1.90 carloads, and $2 in smaller lots; galvanized plain wire, carloads, $2.20; smaller lots, $2.25. Painted barb wire, carloads, $2.30; less than carloads, $2.35; galvanized, carloads, $2.65; less than carloads, $2.70; staples, carloads, $2.15; smaller lots $2.20; galvanized, carloads, $2.55; smaller lots, $2.60. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or De Kalb with actual freight al-

lowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—There has been a fair demand during the week. Prices are without change. We quote Connellsville 72-hour foundry coke, $2.25 to $2.40, though some coke is still held at $2.65 at the ovens. Southern foundry coke ranges from $4.65 to $4.90 Chicago.

Old Material.—The recent snow storms have stiffened the market somewhat and prices are firmer than they have been for some weeks. There is little demand, however, except for light agricultural cast and stove plate, mills buying only as their immediate needs require. We quote dealers' selling prices, gross tons, as follows:

Old iron rails	$14 00 to 14 50
Old steel rails (mixed lengths)	9 00 to 9 50
Old steel rails (long lengths)	10 50 to 11 00
Relaying rails	23 00 to 24 00
Old wheels	11 50 to 12 00
Heavy melting steel	9 00 to 9 50
Mixed country steel	7 00 to 7 50

The following are selling prices for net tons:

No. 1 R. R. Wrought	$10 00 to 10 50
No. 2 R. R. wrought	8 50 to 9 00
Shafting	11 00 to 11 50
Dealers' forge No. 1	9 00 to 9 50
No. 1 busheling and wrought pipe	7 50 to 8 00
No. 1 cast	10 50 to 11 00
Heavy cast (300 pounds and over)	8 00 to 8 50
Agricultural malleable	9 00 to 9 50
Iron axles	14 00 to 14 50
Steel axles	11 50 to 12 00
No. 1 boilers, cut	7 50 to 8 00
Cast borings	3 00 to 3 50
Mixed borings, etc.	3 00 to 3 50
Wrought turnings	6 00 to 6 50
Machine shop turnings	6 00 to 6 50
Iron axle turnings	6 50 to 7 00
Steel axle turnings	6 00 to 6 50
Stove plate and light cast scrap	8 50 to 9 00
Old iron splice bars	10 50 to 11 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Jan. 5.

The market has been extremely quiet this week, but this is attributed to conditions that almost always make the first weeks of a new year dull. Except in bar iron and sheets there is no weakness, but, on the contrary, there are some encouraging signs.

Iron Ore.—General Manager Coulby, of the Pittsburg Steamship Co., will soon establish his headquarters in the Perry-Payne building. Some changes in officials, as noted elsewhere, have taken place, but it is not expected that there will be further changes of importance in the near future. The movement of ore from docks is very slow. There is considerable interest in the coming meeting of the Lake Carriers' Association, especially as to whether important interests not now included in the membership will become identified with it. Vessel owners declare that they will not grant any unreasonable demands of employes and it is expected that if the labor unions are aggressive, the opening of navigation next spring will be very late.

Pig Iron.—Southern iron is firmer, the usual quotation for No. 2 now being $10 Birmingham, but some brands are sold at $9.75 and prices of lower grades have not advanced, the usual quotation for gray forge being $11.85, Cleveland. The advance in quotations of No. 1 and No. 2 irons has resulted in almost a complete cessation of buying. Foundries have no stocks on hand and are insisting upon prompt deliveries of iron recently purchased. Very little Northern iron is being sold, but recent quotations are not being shaded. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$14 00 to 14 50
No. 1 Strong Foundry	14 00 to 14 50
No. 2 Strong Foundry	13 50 to 14 00
No. 3 Foundry	12 75 to 13 50
No. 2 Southern	13 60 to 13 85
Gray Forge, Valley furnace	12 50 to 12 75
Gray Forge, Southern	11 85 to 12 00
Lake Superior charcoal	16 50 to 17 00

Finished Material.—Sales have been few, but inquiries have been more numerous and some buyers seem to be more inclined to place orders. Jobbers, however, complain of extreme dullness. In steel bars, the quotations of 1.30c for Bessemer and 1.40c for open-hearth are adhered to. Competition in bar iron has resulted in some very low prices. The principal producers are still quoting 1.30c at the mill, but 1.25c is the usual quotation of other interests and there are rumors of still lower prices. In sheets, independent interests are very active and are getting considerable business at quotations about $3 under those of the principal producer given below. The trade is anticipating some interesting developments in sheets at an early date. We quote mill sales of black sheets as follows: No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, 7½, 10 and 7 off. Out of stock prices are as follows: No. 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized out of stock, No. 16, 7½ and 7½ off; No. 18-20, 7½ and 10 off; No. 22-28, 7½, 10 and 2½ off.

Old Material.—Dealers who have large stocks on hand are holding for higher prices, and, although there has been more inquiry recently, few sales are being made. Short steel rails and heavy steel are $1 higher. We quote the following gross tons, Cleveland:

Old iron rails	$15 00 to 16 00
Old steel rails (over 6 feet)	11 00 to 12 00
Old steel rails (6 feet and under)	12 00 to 13 00
Old car wheels	13 00 to 14 00
Steel boiler plates	9 00 to 10 00
Malleable iron (railroad)	11 00 to 12 00
Malleable iron (agricultural)	9 00 to 10 00
Heavy steel	11 00 to 12 00

We quote the following net tons:

No. 1 R. R. wrought	$11 50 to 12 00
Mill scrap	9 00 to 10 00
No. 1 machine cast scrap	11 00 to 12 00
Iron axles	15 00 to 16 00
Axle turnings	9 00 to 10 00
Wrought turnings (free from cast)	6 00 to 7 00
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	6 00 to 7 00
Pipes and flues (clean)	8 00 to 9 00
Tank iron	8 00 to 9 00
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 7 00
Stove plate	8 50 to 9 00
Steel axles	13 00 to 14 00
Cast borings	3 00 to 4 00

CINCINNATI.

Jan. 5.

The coke market continues quiet and easy in tone with the asking prices for standard brands at $2.40 and other makes quoted at irregular figures down to $2 f. o. b. ovens. There is not much demand, and sales are small.

Pig Iron.—The market for pig iron has firmed some the past week and aside from a rather small tonnage of Southern iron available at $9.50 Birmingham for No. 2, January shipment, the asking price has been advanced to $10 Birmingham. At the advance there is no business reported but the week is one which does not fairly test the situation. There are no large inquiries in the market and trade has been dull. Trade sentiment here is rather inclined to take the view that the advance will for a time cause the buyer to hold off. It is believed that the wants for the first quarter have been fairly well provided for and at the higher asking price there is not likely to be much business. The larger producing companies in the South seem to have advanced their prices without any understanding or agreement and one of the large companies did not put up quotations until last Saturday, Jan. 2. Northern iron is easier and in the Hanging Rock district $13 furnace has been done. In the Valleys $12.75 furnace is reported to have been done.

In Southern irons the lower grades, No. 4 and gray forge, are not held up to the $10 basis and are offered at $9 for No. 4 and $8.25 for gray forge, Birmingham. Advices from the furnaces all show that for the second quarter higher quotations are expected to prevail and sales agents are being discouraged from seeking to place any orders or offer quotations covering this period. The following are prices current:

Southern Foundry No. 1	$12 75 to 13 25
Southern Foundry No. 2	12 25 to 12 75
Southern Foundry No. 3	11 75 to 12 25
Southern Foundry No. 4	11 25 to 11 75
Southern Foundry No. 1 soft	12 75 to 13 25
Southern Foundry No. 2 soft	12 25 to 12 75
Gray forge	11 00 to 11 50
Northern Foundry No. 1	14 65 to 15 10
Northern Foundry No. 2	14 15 to 14 65
Northern Silvery (8% silicon)	17 15 to 17 65
Southern car wheel iron	18 75 to 19 00

Finished Material.—The market has been quiet and unchanged the past week. It was not to be expected that there would be any important change in the situation in the last week of the year. Bar iron is regarded as a shade stronger and we do not hear of anything lower this week than 1.30c for carload lots. Other quotations are unchanged. Steel bars remain at 1.43c base, half extras, with the retail price 1.75c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 and 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.80c; No. 16, 2.55c; No. 14, 2.45c; No. 12, 2.35c; No. 10, 2.30c. Tank plates are easy and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.90c to 2c for base sizes.

In merchant pipe the leading interest has readjusted quotations to a lower level, which went into effect with the new year. It is understood that the independents have decided to maintain substantially these figures, but sufficient time has not yet elapsed to test this belief. Inquiries are good and the outlook for trade is encouraging. We quote for carload lots as follows f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼, ⅜ inch	68.7	58.7	65.7	55.7
½ inch	71.7	61.7	68.7	58.7
¾ to 6 inch, inclusive	75.7	65.7	72.7	62.7
7 to 12-inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market is steadier, with a moderate movement, but without change in dealers' quotations, which are:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	10 50 to 11 00
Old iron rails, gross tons	16 00 to 17 00
Old steel rails, gross tons	12 00 to 13 00
Old short lengths, gross tons	10 00 to 11 00
Old iron axles, net tons	15 00 to 15 50
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	4 00 to 5 00

PHILADELPHIA.

Jan. 5

Southern iron is firmer and general conditions are somewhat improved, as there is more inquiry from large consumers and a better feeling about prospects. Labor has made concessions asked. Several large furnace companies have been made contracts for coke for the first quarter at prices which the coke companies claim are below cost.

Pig Iron.—Very few sales have been made for two weeks, but the market is not weak. Prices have not changed, the quotation of Southern being $13.75 to $14, Philadelphia, for No. 2, while Northern No. 2 X sells at $15 to $15.25. Some sales of basic have been made at $14 delivered.

Steel.—Business has been very dull, but indications are that orders of considerable size will soon be placed.

Finished Material.—It is commonly believed that business will be good in a few weeks. In structural material not much is being done. Prices are: Beams, channels and angles, 1.73½c to 1.85c; small angles, 1.45c to 1.50c. Prices for bar iron are very irregular, the usual quotation being 1.35c delivered. Stocks of sheets are light and there is some prospect of improvement.

Old Material.—Low prices are beginning to receive attention, but sales are neither numerous nor large. We quote: Old steel rails, $11.50 to $12; heavy steel, $11 to $11.50; old steel axles, $14.50 to $15; old car wheels, $12.75 to $13.25; No. 1 R. R. wrought, $14.25 to $15; cast borings, $6 to $7; stove plate, $9.25 to $9.50; wrought iron pipe, $10 to $10.50.

Review of the Lake Ore Trade in 1903.

(Special Correspondence.)

DULUTH, Minn., Jan. 4.—Estimating the all-rail shipments of lake ores in 1903 at 450,000 tons, and including the shipments from Michipicoten, Ont., all of which latter is as directly in competition with American ores as though shipped from any one of the five ranges on the American side, the business of the past year on the Lake Superior region has been as follows, by ports in order of importance:

	1903	1902	1901
Duluth	5,350,473	5,598,408	3,437,955
Two Harbors	5,120,656	5,605,185	5,018,197
Escanaba	4,277,561	5,413,704	4,022,668
Superior	3,978,579	4,180,578	2,321,077
Ashland	2,823,119	3,553,119	2,886,252
Marquette	2,007,346	2,595,010	2,354,284
Michipicoten	203,419	298,421	231,032
Gladstone	85,816	92,375	117,089
All-rail	*450,000	531,952	431,715
	24,302,969	27,869,524	20,820,269

*Estimated.

The year 1902 shot ahead out of all proportion, in its ore movement, and 1903 simply gets back to the customary advance of about 10 percent a year, an advance that has been carried along quite closely for a long time. It is almost needless to state that the trade does not look for any advance in 1904, but rather a distinct falling off from 1903. Iron ore shipments from the various lake ranges during the past and several preceding years, have been as follows. The figures for 1903 are not exact, since the all-rail shipments for 1903 and their distribution among the different ranges are both estimated:

Range.	1903	1902	1901	1900
Mesabi	12,828,964	13,342,840	9,004,890	7,809,535
Menominee	3,651,266	4,627,524	3,623,730	3,261,221
Marquette	3,114,396	3,853,010	3,240,699	3,457,522
Gogebic	2,828,180	3,663,484	2,938,155	2,875,295
Vermillion	1,676,744	2,084,263	1,786,063	1,655,820
Michipicoten	203,469	298,421	231,032	64,135
	24,302,969	27,869,542	20,820,269	19,123,528

The total shipments of the several ranges from the period of their beginning to the close of 1903, have been as follows; in gross to—

Range.	When opened.	Total shipments.	Percent.
Marquette	1850	69,800,898	28.6
Mesabi	1893	66,576,771	27.2
Menominee	1877	45,918,499	18.8
Gogebic	1884	40,646,454	16.6
Vermillion	1884	20,738,250	8.5
Michipicoten	1900	794,645	0.3
Total		244,475,517	100.0

These totals vary from some on account of the fact that the shipments from the Michipicoten range have been included therein.

The past year has witnessed many surprises in the iron trade and has seen the pendulum swing from the most optimistic point of view to the extreme reverse. But if there has been built an over capacity for steel and iron, there would also seem to be developed an over capacity for ore and its transportation, for extreme dullness prevails in the one as in the other. Ore mines are as quiet as finished steel. A change came early in the second half of the year, in the abatement of demand for ore properties, and in the cessation of inquiry for explorations. Mesabi proven ore lands had been in sharper demand in the early part of 1903 than ever, and they had brought higher prices from furnacemen whose needs were not filled for a long term of years. The bars of chemical analysis had been let down to such an extent that properties which a few years ago would have not been considered merchantable ore were readily accepted, and the basis of calculation of tonnage was reduced, in some extreme cases, to an ore carrying 50 percent iron, and with no regard to the phosphorus content. For ores little higher buyers were ready to contract a large annual tonnage at from 30 to 35 cents a ton royalty and a considerable cash

bonus, the size of the latter depending on conditions and the complaisance of the sellers. Few properties were left long on the market seeking purchasers.

This all changed, almost in a night. There were no buyers, one could scarcely give away an ore property, and the argument of the hopeful seller, that ore was getting more and more confined and scarce, fell on deaf ears. Early in the year there had been no less than 250 drill outfits working on the two Minnesota ranges alone, and probably 75 more or Michigan properties. Today less than 100 drills are busy in the entire Lake Superior region. Some of these are in Southern Wisconsin, in the new Baraboo fields, a section of Huronian rocks that may contain economically important deposits of ore, and are thought by many to have been proved to do so. No branch of the iron mining industry has suffered in the past six months as has that of exploration and there is nothing to indicate any very rapid recovery.

The largest steel making interest has not been slow in taking up new ore lands the past year, though most of its purchases were made prior to the change in financial conditions, and it is doubtful if they could have been consummated three months later than they were. This interest bought the largest independent block of undeveloped ore lands on the Mesabi during the summer, securing probably not less than 100 million tons of excellent ores in what has been known as the "Chemung deal." It secured also large and valuable ore properties in its purchase of the properties of the Union Steel Co. about the first of the year. The fact that it has further strengthened its already overwhelming ore reserves should have led others not so fortunately placed to a livelier search and inquiry, and no intervention of dull times in the steel trade should have permitted them to lag in their desire. On the contrary the very dullness should have been taken advantage of to enable them to secure ore lands at lower prices than had been demanded and received a few months earlier.

Early in the past year ore bodies running lower in grade than would have, a few years before, permitted their entry into the list of merchantable properties, were readily sold to consuming interests at high prices. The U. S. Steel Corporation did little of this buying, for its selections, generally speaking, had been made some time before and were different. Explorations during the year were not especially successful. A few ore bodies have been discovered upon the Mesabi range, and the probably fruitful limits of the district have been more closely defined. Work in the Menominee district has not been attended with any remarkable finds, though it still remains one of the favorite fields of exploration. In all the vast Canadian region north of the lake, where drills have been steadily employed at high costs, nothing worthy of mention has been opened and the prospects are not so good as a year ago. On other Lake Superior ranges new finds have amounted to little. Old mines have been extended, new leases lying adjacent to those mined have been opened into, and the tonnages in sight has been maintained fully up to what it was a year ago, probably to a much greater amount. But this is not sufficient.

In 1901 Minnesota, for the first time, passed in production 50 percent of the entire Lake Superior region. In the following year the state mined 55 percent, and in 1903 it produced 59.7 percent of the whole. The burden of the year was thrown heavier than ever upon the Mesabi range. The figures are significant. It is not only from the fact that Mesabi mining is cheap and that production can quickly be accelerated there, that it is called upon for the greater share annually, but for the reason that old ranges are having difficulty in maintaining their product and steel makers want to preserve their scarcer ores as long as possible.

A year ago there were some 17 Mesabi mines then in development stage, all expecting to produce more or less heavily during 1903. A like number had made a small output during the preceding autumn, and were under extensive development for the coming season. Now there are but five mines on the Mesabi range in process of development for initial shipments in 1904, and the number planning to increase materially their outputs of the preceding year is very small.

In the year past the steam shovel and the open pit methods have spread to older ranges and have become firmly fastened. On the Mesabi adaptations and modifications have been such that the system is widening its field, and it is safe to say that there are few mines on the range that, were development to be commenced at this time, would be opened underground. With changes in the methods that are evidently coming, open pit mining will be still more popular on all ranges and will be adopted at many properties where it has seemed impossible.

It takes more money to make initial development in a mine by stripping than by the customary methods, but once opened, the costs of mining are tremendously reduced and the possibilities of output are enormously enlarged. It is largely on account of the fact that lake mining is in the hands of large and powerful corporations, with abundant money at command, that it is possible to make such costly improvements in the way of opening mines, trusting to future operations at a lower expense to bring back the investment. It is for the same reason that such elaborate mine equipments and betterments are now under way at underground properties. Never in the history of mining has money been spent so freely for improvements as during the past year or two. The outlook is not restricted to the immediate future, or to the necessity of earning money for regular dividends upon the direct operation of the mine, but is over a longer period, and on a broader basis. If it will save in the long run, above interest and depreciation, an improvement is considered, no matter what its first cost may be. And this is bringing to the Lake Superior iron mining region a class of betterments that have never been seen in any mining district, and is lowering tonnage costs to a point never before reached.

Nevertheless, little of really novel character has been undertaken during the past twelve months in the way of engineering and mechanical feats. More notable than anything else is the permanent and substantial character of works now undertaken for the winning of ore bodies. Splendid shafts are now sunk at great cost in rock and are so placed that they will endure so long as the mines they are to tap can be hoped to remain. These are nowadays steel lined and steel capped, with magnificent houses, equipped for the most refined handling of product at least possible cost. Power plants, haulage systems and the like are of a sort not previously possible. The best thought of the best engineers is directed towards a saving in costs and the mines are not hampered by a lack of cash to carry out improvements on existing methods.

Relations between capital and labor in the Lake Superior mining region have been pleasant all through the year. It is, indeed, very seldom that they are anything else. Labor is regularly well paid and steadily employed, and every possible step is taken to aid to the safety, comfort and convenience enjoyed by the miners. There came, near the close of the year, the necessity of a reduction of wages and of number of employes, but this was adjusted as carefully as possible to individual conditions prevailing at various points and whenever possible was coupled with a decrease of rents in company houses that goes far to make up for the cut in pay. The attitude of employers throughout the Lake mining region has always been thoughtful, considerate and just towards employes, and this has had a marked effect in maintaining quiet throughout the district.

Pittsburg Foundrymen's Association.

The monthly meeting of the Pittsburg Foundrymen's Association was held on Monday evening, Jan. 4. President A. W. Slocum was unable to attend, owing to illness, and the meeting, owing to the small attendance, was informal. J. A. Holmes, chief of the department of mines and metallurgy at the St. Louis Exposition, was present and presented in detail the proposal for a foundry building in connection with that department. The foundrymen of the country are asked to subscribe $10,000 for this purpose. The following members and others attended the meeting: J. S. McCormick, J. S. McCormick Co.; B. D. Fuller, Westinghouse Electric & Mfg. Co.; L. E. Dunlap, Mackintosh-Hemphill & Co.; Wm. Yagle, Yagle Foundry & Machine Co.; S. D. Sleeth, Westinghouse Air Brake Co.; H. M. Hooker, H. M. Hooker & Co.; Geo. P. Maury, Metallurgical Laboratory; Jos. Dorsey, Enterprise Foundry Co.; H. S. Ridenour, Thos. Carlin Sons Co.; John Birch, Pittsburg Malleable Iron Co.; Bryan Robertson, Field-Evans Iron Co.; P. M. Phillips, Mr. Loder, T. B. Clark, F. H. Zimmers, Union Foundry & Machine Co.

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THE STEEL TIE AND CHEAP STEEL.

The steel railroad tie is destined to come in for a great deal more attention this year than it has lately received. When we referred to the subject some time ago it was not so certain as it is now that the steel mills were destined to be hungry for tonnage. Billets were then at $27 and steel bars at 1.60c base. American mills had not made an extremely low price at mill in order to dump what tonnage of sheet bars they could in England.

Now the complexion of affairs has decidedly changed, and it can be taken that a pretty low price can be made on a steel tie, which does not involve too much work to produce it from the crude steel. Reference was made to the experimental tie used on the Pittsburg, Bessemer & Lake Erie road, which has since been described in our columns. It weighs 175 pounds and it is regarded feasible to reduce this weight to 150 pounds. It was shown that a steel tie could cost twice as much as a wooden one, if its life were 25 years, which is of course feasible. The 150-pound tie, therefore, would have to sell at a cent a pound, to compare on even terms with a 75-cent wooden tie in first cost and sinking fund and still have the advantage that it would have to be laid but once in 25 years, while three successive wooden ties would have to be laid in the same time. With the present outlook in the steel business, the comparison is extremely favorable for the practical advent of the steel tie whenever the mechanical difficulties are solved. The events of the past few months have solved the commercial problem, by the decline in steel.

As steel has fallen the outlook for cheap wooden ties has not improved. Railroad managers have been very seriously studying the problem of the wooden tie. Attention has been drawn to the possibility of cultivating tie timber, in contrast with the wasteful methods of taking what comes which have heretofore prevailed, but investigations have not led to any hopeful conclusion. A Western railroad system which recently investigated the subject found that using the quickest growth timber available for ties, it would require nearly 750,000 acres, continuously employed in raising timber, to meet the steady requirements of its present trackage —over a thousand square miles. They could not count upon an average annual product of more than three or four ties per acre. Where ties must be most often replaced, their life is about eight years, which means, at 2,800 ties per mile, an average of 350 ties per mile per year. On less used roadbeds the life is longer, but a general average might be struck at about 300 ties per mile per year, requiring from 75 to 100 acres of regularly cultivated land to supply. Of the 275,000 miles of single track in the country, as recently reported by Poor's Manual, over 200,000 miles are necessarily subject to replacement at the rate of 300 ties a year, which would mean for the whole country from 15 to 20 million acres, lying between the area of West Virginia and that of Ohio. This computation, based on careful investigation, is sufficient to indicate that growing timber on an extensive scale for tie purposes is not feasible, even without taking account of the fact that before practical results could be obtained the demands of the country would have greatly increased.

There is of course a large quantity of tie timber in the United States at the present time. There are large forests in the northwest of suitable timber, while in the East the long leaf yellow pine of the South Atlantic States would be a sufficient supply for Eastern roads for some years to come, were cost of transport not considered. What has advanced the cost of ties in the past few years, and will have the same influence in the future, is that the available timber is farther and father from the streams. It does not pay to build railroads to the constantly shifting base of production.

With the steel industry it is different. It is already organized for other purposes, yet capable of producing steel ties when the design and the demand appear. It seems entirely possible that within the limits of less than a decade the steel tie industry will have taken a place in tonnage alongside of rails, structural shapes or wire.

INTERNATIONAL PHASES OF THE IRON TARIFF.

Four weeks ago, in discussing at long range the outlook for foreign iron and steel trade, we laid special stress on the likelihood of Russia greatly increasing her strength in the Far East, where the international position of something like half the world's population which now does not use iron to any extent lay at stake. The brief time that has elapsed has greatly accentuated the present day importance of this subject. Ninety years ago Napoleon predicted that in one century the world would be either Cossack or republican. In the light of present developments the remaining ten years may well be sufficient to determine this question. No one needs to doubt what Cossack control would mean. Russia's iron possibilities are greater than were those of the United States a brief quarter century ago and the magnificent object lesson of the United States is not a suggestion but a command to the Czar as to what he should do. Germany's friendship will be quickly dropped, and he will want neither German, English nor American iron and steel. His method of keeping it out may be much more drastic than the republican method. In case it should fall out that Japan could

stay the Russian advance there is no consolation for other iron producing nations. Japan has her own ambitions. The door to nearly half that portion of the world's population which is yet to be educated to the use of iron is even now swinging on its hinges. England controls much of the rest. When she is even now agitating for a tariff at home is there hope for us in her colonies, even if the Cossack does not get the biggest of them?

Germany alone has no colonies and is forced to seek world markets, of which efforts she makes her domestic consumers pay the expenses, and on the basis of actual fundamental costs of production Germany is perhaps ahead of us today. The fight for what the Cossack and British may leave will be all the more bitter. In the light of all this there are some people in the United States who want to use our tariff as a clumsy instrument to control the United States Steel Corporation. If this or other consolidations need control something more certain and less dangerous must be found. Germany is eager for appointment as schoolmaster to the United States Steel Corporation. She would conduct a school where there would be more flogging than recitation. Surely the American people can devise a better system of discipline.

The year we have just entered, being both a Presidential and a Congressional year, is one in which the American people must make important decisions. Will the tariff be kept in its fullness as a protection against the dumping of Germany, and against possibly new dumping nations, and as a valuable means of negotiation to secure some otherwise closed foreign markets? It is for the friends of the tariff, when considered in this light, to devise whatever means are necessary, as a result of the late consolidations, to guarantee domestic consumers a fair level of prices. The tariff was accepted by the American people largely because bond was given by its friends that competition would prevent abuse. Much of that competition having been removed, the bond has become somewhat impaired in value. The court which last passed upon the Northern Securities Co. held that the possession of power was of as much moment as the exercise of the power in actual practice. The people who make the laws may if they choose arrive at the same conclusion regarding the curtailment of competition. The task before the friends of a protective tariff is to convince the people that the interests of labor in the iron trade and related industries, and the interests of home competitors of the United States Steel Corporation, as well as of the vast related and dependent industries of the country, will be sacrificed by any changes in the existing traffc that may be specifically aimed at the steel corporation. In making their campaign, as they will no doubt be called upon to make it in the coming year, the protection forces can stand on no other platform than the original one, that the tariff is not designed to foster monopoly but rather to guarantee competition and a fair domestic price, while at the same time it preserves the home market to American labor.

An attractive catalogue of 115 pages illustrates the products of the American Iron & Steel Mfg. Co., of Lebanon, Pa. Four full-page plates in the front of the pamphlet show respectively the Central works at Lebanon, Reading works at Reading, West works at Lebanon and East works at Lebanon. There are four pages also devoted to facsimiles of various exposition medals awarded the company for exhibits of its products. Then follows a brief historical sketch, and after it in order engravings and details of the company's refined iron, bolts, lag screws, hot-pressed nuts, cold punched nuts, rivets, washers, turnbuckles, etc. Space is given to some special data on the company's Harvey grip thread track bolt. Results of tests are given showing the excess of tensile strength of these soft steel cold-pressed thread bolts over that of iron cut-thread bolts of the same diameter. It is shown that the steel bolts broke in each case in the shank of the bolt itself, leaving the threaded portion just as when put under stress. There was great reduction in area at the point of fracture, caused by the elongation of the bolt under tensile strain.

THE AMERICAN IRON AND STEEL ASSOCIATION.

In the current issue of the *Bulletin* announcement is made of the election of Joseph Wharton as president of the American Iron and Steel Association. Mr. Wharton and the late B. F. Jones and the late Andrew Wheeler had been for years the active counselors of General Manager James M. Swank in the supervision of the association's work. The *Bulletin*, in referring to the death in the past year of President B. F. Jones, Vice President Abram S. Hewitt and Treasurer Andrew Wheeler, speaks of the election of Mr. Wheeler's son, Andrew Wheeler Jr., as treasurer, and of the continuance in office of Wm. Metcalf, president of the Braeburn Steel Co., as vice president, and of David Reeves, president of the Phœnix Iron Co., as auditor. The article continues:

"The vacancy caused by the death of Mr. Jones has been filled by the promotion of First Vice President Joseph Wharton, this selection having been indicated by correspondence with many representative manufacturers as their choice for the position. It has not been thought necessary to call a meeting of our members to formally ratify this choice. In addition to his manifest fitness for the presidency of the association Mr. Wharton's long incumbency of the office of first vice president naturally indicated his selection as Mr. Jones' successor. Mr. Wharton is well known to our old members, especially for his activity in the tariff contests of the last 30 or 35 years, in which this association has taken a leading part. He was identified with the Bethlehem Iron Co. during its whole life, and with its successor, the Bethlehem Steel Co., until the recent sale of its plant. He is now a manufacturer of pig iron at four modern furnaces in New Jersey, and is a stockholder and director in the Seaboard Steel Casting Co., at Chester, Pa. His incumbency of the office of president may be regarded as dating from Jan. 1, 1904.

"The office force of the association now consists of seven persons, the result of a steady growth in the business of the office since the days when three persons did all its work. Mr. Wm. G. Gray, with three assistants, is in direct charge of our statistical division, as in recent years.

"The work on our new directory is being pushed as rapidly as possible and is now very far advanced toward completion. The new book is greatly needed and we are sure that it will be heartily welcomed by the trade when it makes its appearance, as it will be in all respects the most complete we have ever issued. The changes that have taken place in the last two years have been both numerous and important. The collection of our statistics for 1903 has already commenced and results may be looked for in the *Bulletin* and in the annual report at the usual periods of publication.

"The American Iron Association was organized in Philadelphia on the 6th day of March, 1855. In 1864 the association was reorganized and its name was enlarged to the American Iron and Steel Association. This action was taken at a very large meeting of manufacturers from many States which was held at the Board of Trade rooms in Philadelphia on the 16th and 17th of November, 1864. The reorganized association, which has been active ever since, is therefore now in its 40th year. From 1864 to 1904 the association has had only five presidents, including Mr. Wharton, who had served as first vice president since 1875. Still another vice president, William Metcalf, has served since 1884. In the same period of nearly 40 years the association has had only three treasurers, Charles Wheeler serving from 1864 to 1883 and Andrew Wheeler from 1883 to November, 1903, when he was succeeded by his son, Andrew Wheeler Jr. In its whole history the association has had only four secretaries.

"The first president of the American Iron and Steel Association was Captain E. B. Ward, elected at the reorganization in 1864, who resigned in 1869, when he was succeeded by Samuel J. Reeves, who had been vice president since 1864. Mr. Reeves served as president until his death in December, 1878. In March, 1879, Hon. Daniel J. Morrell was elected president, serving until December, 1884, when he resigned owing to ill health. In January, 1885, Hon. B. F. Jones was elected president, who served until his death in May, 1903."

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., NEW YORK, Jan. 5.

The December machinery market was marked by quietness, which was expected when the month opened. Of all the manufacturers seen, only one said he did more business than in the previous month. Whatever contracts were booked were as a rule made up of small amounts. Wherever it was possible to defer a purchase until the new year, this was done, and the dullness which prevailed may be ascribed to this fact rather than any adverse underlying conditions. This may also account for the few inquiries received, the number being the smallest in any month of the year. Taking all the developments of the month, they cannot be invested with any importance, nor did they give any inkling of what might be expected for the new year.

In machine tools there were no orders of note booked. The miscellaneous business—which is the way merchants have of denoting orders from every conceivable source—may be said to be all that was in evidence. Nothing was heard from the railroad propositions, which have engaged the attention of manufacturers for some time. The only information that reached the "street" in connection with these was that they were in a better way of closing than they had been, but dealers want something more definite than this.

Those who dicussed the machine tool outlook for the coming year frankly admitted that they had very little to offer so far as specifying the sources from which they expect orders in the future. All were inclined to the belief that their business would at least get no worse than it has been. The most conservative men in the trade said that the year opened with more uncertainty about it than they could note at the opening of any year for the past four or five years. Wherever it was said that the business outlook was either good or excellent, there was a "but" added, which smacked more of uncertainty than it did of actual trade. Of business actually under consideration not much can be said. Mention might be made of the equipment for the new shops of the Lehigh Valley railroad at East Sayre, Pa.; the equipment for the new shops the General Electric Co. is erecting at Schenectady, N. Y., and for the International Steam Pump Co.'s new Worthington plant at Harrison, N. J. All of these are expected to develop into orders in the early part of the new year, but much will depend on the condition of the money market. It is said that the Erie and Grand Trunk railroads will make substantial purchases of machine tools in the near future. This comprises practically all the large contracts machine tool men see in sight at present. They think that purchases of small lots will make up a good part of their coming year's business, but have nothing to say beyond hoping that the future will bear them out in the belief.

This leaves the export trade for consideration. About the only definite information that can be chronicled in this direction now is that exports are being pushed more vigorously than in years. The work was so recently started that very few orders have come, but many believe that ere long the American manufacturer will make himself felt on the other side of the ocean.

In engines and boilers, December on the whole was a duli month. In the business closed manufacturers came in contact with makers of electrical machinery more frequently than usual. The Eastman Kodak Co., of Rochester, N. Y., gave orders for one 350-h. p. engine to the Ball Engine Co., of Erie, Pa., and for two 225-k. w. engine-type generators to the Crocker-Wheeler Co. The Dixon Crucible Co., of Jersey City, gave orders for a 450-h. p. engine to the Allis-Chalmers Co., and for one 300-k. w. engine-type generator to the Crocker-Wheeler Co. The Groton & Stonington railroad, of New London, Conn., gave orders for two 450-h. p. engines to the C. & G. Cooper Co., of Mt. Vernon, O., for two 300-k. w. engine type generators to the Westinghouse Electric & Mfg. Co., and for 600-h. p. boilers to the Sterling Co., through its New York office. For all of those orders the competition was of the keenest. The Groton & Stonington order was particularly a magnet to engine men, twelve manufacturers practically having representatives on the ground for a week. One of these was a New York man, whose expenses footed up to about $150, and he didn't get the order.

Engine and boiler builders say there is less business before them now than at any time in some years. One manufacturer, whose make ranges from 200 to 1,000 h. p., told your correspondent that prospective business in his line did not amount to 5,000 h. p. all told, and one concern alone was represented to the extent of 2,300 h. p. in his estimate. Many engine manufacturers are fast reaching the end of their order list. Promises of early delivery bear testimony to this fact. For 300-h. p. compound engines the longest time asked is three months and some makers are willing to guarantee delivery in 45 days. For simple engines of the same horsepower better delivery yet is promised. A matter on which manufacturers of engines, boilers and electrical apparatus lay stress, is that nearly all the orders placed with them recently, as well as much business that is in prospect, are from going establishments, showing that the business of the latter has fallen off to an extent that permits of replacing old equipment with new. Orders for machinery for new enterprises are relatively few. Makers of power transmission machinery likewise say that their December business was only of moderate volume.

Among those who expressed hopeful views of the machinery outlook emphasis was laid on the immense sums which railroads will expend for betterments—amounting, according to one estimate, to $150,000,000, of which the Pennsylvania railroad alone will supply $67,000,000; the awakening in the building industry, of which the large cities especially give indications; the probable improvement in the money market, which is expected to make funds for industrial enterprises more plentiful than in the year just closed; the absence of any industrial organizing carnival, with its attendant evils; the disposition of organized labor to be less arbitrary in its demands than it was in 1903, and the extension of municipal enterprises.

The closing of the old year in machinery circles found collections generally slow and the element of uncertainty now entering into some of their accounts makes exact comparison of 1902 and 1903 difficult for some concerns. In general machine tool manufacturers are not credited with as good results from 1903 as from 1902, while electrical machinery manufacturers claim that their business for last year was all the way from 5 to 30 percent better than 1902.

Paul Bigelow, the local representative of the Buckeye Engine Co., Salem, O., closed contracts recently for one 125-h. p. engine with the Construction Co. of America, of Pittsfield, Mass., and for two 75-h. p. hand regulating cutoff variable speed engines, with the Rotterham Light & Power Co., Portsmouth, N. H. He also has one order aggregating 600 h. p. practically closed.

Decreased Earnings of the U. S. Steel Corporation.

The quarterly meeting of the directors of the United States Steel Corporation was held in New York city Jan. 5, all being present except John D. Rockefeller Sr., Marshall Field, of Chicago, Nathaniel Thayer, of Boston, Francis Peabody and United States Senator John F. Dryden, of New Jersey.

The dividend on common stock was passed, but the 1¾ percent on preferred was declared. For the year 1903 the net earnings (December estimated) aggregate $108,979,012, as against $133,308,763 in 1902 and $105,947,000 in the first nine months of the corporation's history in 1901. For the last quarter of 1903 net earnings (December estimated at $3,100,000) were $14,845,042, as against $31,485,759 for the same quarter of 1902, and $29,760,912 for the corresponding quarter of 1901.

The net balance, after appropriations for sinking fund bonds of subsidiary companies, depreciation, improvements and construction and interest on the regular bonds, as well as sinking funds, have been deducted, is $60,824,380, as against $90,306,524 in 1902. The undivided profits or surplus for 1903 aggregate $11,962,645, which is less by $22,291,012 than in the previous year. This is partly accounted for, however, by the charging off for depreciation in inventory valuations and for adjustments of sundry accounts of $5,750,000, as against nothing in 1902. On Dec. 31 last the company's unfilled orders aggregated 3,215,123 tons, as against 5,347,253 on the same day of 1902.

A prominent official of the corporation said that the plan to distribute $5 dividends to employes who subscribed to the preferred stock under the profit-sharing plan in Jauary, 1903, will go through without modification or change of any sort. Checks are now being drawn and will be sent out in the course of the week. The work entails much physical labor, as many thousands of employes participate in the plan.

The Labor Situation.

NEWS OF THE METAL TRADES ASSOCIATION.

The Cincinnati Employers' Association is now under way and the membership is growing rapidly. Mr. Chas. F. Waltz, the secretary, has started a movement to organize a State organization and has sent out letters contemplating a meeting to be held in Columbus, O.

The Milwaukee Metal Trades Association will have a dinner on Thursday, Jan. 14. That of the Milwaukee Foundrymen's Association comes on Tuesday evening, Jan. 12.

Arrangements are being made by Commissioner DuBrul, of the N. M. T. A., to have H. L. Gantt, of Schenectady, N. Y., address the annual convention of the association at Philadelphia, March 16 and 17, on "The Necessity of Exact Detailed Knowledge as the Basis of Compensation for Work Done."

S. W. Watkins, president of the N. M. T. A., is expected to arrive in New York on Jan. 9 from his European trip.

The N. M. T. A. office is using its best efforts to defeat the 8-hour bill, which will be before the Senate at Washington this month.

A meeting will be called by Commissioner DuBrul, of the N. M. T. A., of concerns in New York interested in millwrighting with a view to having that interest become eligible to membership in the National Metal Trades Association.

The Cincinnati Metal Trades Association will have a dinner on Thursday, Jan. 14.

REMOVAL NOT DUE TO LABOR TROUBLES.

In reply to an inquiry, Greenlee Bros. & Co., manufacturers of wood working machinery, write as follows: "The item in the Chicago papers regarding the removal of our plant to Rockford on account of labor trouble was entirely of their own assumption. We have built a new plant in Rockford for one department of our business and are about removing this work to that place, but we do not intend to remove entirely from our present plant which will continue in Chicago. We did not have sufficient capacity here for our increasing trade and did not have any switching facilities nor could additional ground be obtained at reasonable rates. For these reasons we decided to separate a part of our work and do it outside this city. There is little ground in our case or in others that we know of, for the talk about manufacturers moving out of Chicago. There are more coming in in a month than are moving out in a year."

LABOR NOTES.

At a conference between officials of the Amalgamated Association and the officials of the Republic Iron & Steel Co. an amicable adjustment was effected of a grievance which has been pending for some time at what is known as the Valley mill of the company. Until several weeks ago the men employed in turning out skelp iron on the bar mill were paid the bar mill scale. The company made a change by which the earnings of the men were materially reduced, and, though they continued working, they laid their grievance before the Amalgamated officials for a settlement. Under the terms of settlement when 51 percent of the product of the mill is skelp iron, the men are to be paid the skelp mill scale, with extras added for guide mill work.

At the Ohio works, Youngstown, of the Carnegie Steel Co., a wage reduction became effective Jan. 1. A statement of the extent of the reduction was given out by the officials as follows: Furnace department—Number of men employed, 382; men affected, 346; percent of men affected, 90.6; percent of reduction on men affected, 8.43. Converting mill—Percent of reduction on payroll, 23.81; number of men employed, 382; number of men affected, 328; percent of men affected, 85.9; percent of reduction on men affected, 26.44. Blooming mill—Percent of reduction on payroll, 8.28; number of men employed, 65; number of men affected, 42; percent of men affected, 64.6; percent of reduction of men affected, 10.8. Office force—Percent of reduction on payroll, 5.67; number of men employed, 38; number of men affected, 28; percent of reduction of men affected, 7.42. Averages and totals in every department throughout the entire plant—Percent of reduction on entire payroll, 11.32; number of men employed, 2,171; number of men affected, 1,788; percent of men affected, 82; percent of reduction on men affected, 13.41.

At the opening of the new year, the labor situation in New York City is more favorable than it has been for a long time. On Jan. 1, 50,000 men went to work under trade agreements beginning on that day instead of May 1, which was formerly the beginning of the industrial year. The new agreement provides for arbitration, and the amicable relation existing between employer and employ is very encouraging. The old Parks union is practically dead and the more conservative labor leaders are acting in harmony with the Iron League. The George A. Fuller Co. has made application for membership in the Building Employers' Association and its entrance into the association will add strength to the employers, as all the principal contractors are now united in favor of the arbitration policy.

Notice of a readjustment of wages of the employes of the Republic Iron & Steel Co., not identified with the Amalgamated Association, was posted at Youngstown, Dec. 31. It includes all the rolling mills, furnaces and the Bessemer steel plant in that district, and provides for a general reduction. The notices instructed the men to call on the foremen of their respective departments to find out the new wage rate. The new rate of wages became effective Jan. 1.

La Belle Iron Works, Steubenville, O., posted notices a few days ago stating that when resumption takes place in January there will be a general revision of wages amounting to about 10 percent reduction.

A reduction averaging 10 percent was made in the wages of furnace workers in the Mahoning and Shenango Valleys, taking effect Jan. 1.

A reduction of wages at the American Bridge Co.'s works went into effect at the close of the old year. Piece workers are reduced 10 percent. The salaries of the office employes have also been reduced.

The Sharon Steel Hoop Co., Sharon, Pa., has made a reduction of 10 percent in the wages of its employes, except those who are governed by the Amalgamated scale. The company employs about 1,300 men.

The boilermakers in the shops of the Southern railway at Princeton, Ind., and Louisville, Ky., are out on a strike. Non-union men are at work at Louisville in place of the strikers.

Representatives of 7,000 machinists of Chicago held a meeting Dec. 30 and decided to demand an increase in wages when the present contract expires in May. In the interim, if any employer seeks to reduce wages, increase hours or lock out his workmen, an effort will be made to put the new wage scale into effect before work will be resumed. The following minimum scale of wages was adopted: Machinists, nine hours, present scale, $2.70, wages asked, $3.00; die and tool makers, present scale, $3.15, wages asked, $3.50. It was resolved that the union support all machinists locked out or called on strike, in order to enforce proposed conditions, to the extent of paying the regular strike or locked out benefits.

The striking molders at the Case Threshing Machine Co., Racine, Wis., have settled all differences with their employers and resumed work Jan 4.

Notices of a wage reduction were posted in the McKeesport plants of the United States Steel Corporation last week. The cut includes every employe from heads of departments down to laborers. Ten thousand men are affected.

NEW BOOKS.

"Sexton's Pocket Book on Boilermaking, Shipbuilding and the Steel and Iron Trades in General" is a 3 x 5-inch leather-bound book of 319 pages. The present is the sixth revised edition. It deals with practice from the point of view of an English expert, and contains much information in compact and easily handled form. The shipbuilding section does not take the amount of space given to other subjects, boilermaking and kindred branches having 290 pages. A noteworthy chapter deals with cost of construction in England. A number of boilers are illustrated and briefly dimensioned. These are accompanied with a record of the time required for building, the total weight, amount paid to labor and the aggregate cost. Some structural work, masts, etc., are detailed in the same manner. The book is bound in red leather, with gilt edges, and is secured by an elastic band. Published by Spon & Chamberlain, of 123 Liberty street, New York. Price, $2.

"The Factory Manager and Accountant," by Horace L. Arnold, details the management systems as practiced in a number of plants. The establishments selected for illustration include the Link Belt Engineering Co., of Nicetown, Pa.; C. B. Cottrell & Sons Co., of Westerly, R. I.; the Bigelow Co., of New Haven, Conn.; Potter & Johnston Machine Co., of Pawtucket, R. I.; Wells Bros. Co., of Greenfield, Mass.; C. W. Hunt Co., of West New Brighton, N. Y. Two of these have been given at some length in *The Iron Trade Review*, and the further discussion with particulars of other methods will be found helpful in re-arranging the order of things in an old system or devising a radical change. The author has taken pains with the exact reproduction of the forms used by the various concerns; the sizes and colors of the originals are given and with these details faithfully copied a certain amount of progress is made in imitation at least. Initiative more than imitation is essential in the handling of a successful system. The book contains much useful information to that end. It is cloth bound, has 432, 6 x 9-inch, freely illustrated pages and is published by the *Engineering Magazine*, Liberty street, New York. Price, $5.

"The Mechanical Engineer's Reference Book," by Henry Harrison Suplee, was announced some two months ago in *The Iron Trade Review* and is now at hand. In size, color and style of binding the book bears a strong resemblance to the familiar "Trautwine" and may take the position with mechanical engineers that the other authority has done in civil engineering. "Suplee's Mechanical Engineering" is intended to be a successor to the well-known pocket book by the late John W. Nystrom. The plates and stock of that book were destroyed by fire some years ago and in the present work the old material has been utilized to a limited extent and with such modifications as latter day engineering requires. The volume is printed in clearly read type, there are 837, 4 x 7-inch, pages with indices, etc., bound in leather. A thumb index adds materially to the usefulness of the work for ready reference and the price of the book so equipped is $5.50; it is also supplied without the thumb index for $5. The amount of information given cannot be detailed in the present review. In form and matter it is most creditable to the author and to the publisher, the J. B. Lippincott Co., of Washington square, Philadelphia.

"Change Gear Devices," by Oscar Perrigo, traces the development of the screw cutting lathe and the essential features of the many expedients for effecting the desired ratios between work and feed are described. The author has done more than this service to inventors and designers generally by the addition of the synopsis presenting the patents in classes. Any one who has occasion to investigate "the state of the art" will find the information has been concisely prepared for him by one who thoroughly senses the value of shop time. The treatise has 81, 5½ x 8-inch pages, with many illustrations, including an excellent portrait of the author. The Derry-Collard Co., of 256 Broadway, New York. Price, $1, cloth bound.

The Derry-Collard Co. has also published another pamphlet which treats of "Threads and Thread Cutting." The subject is handled in shoppy style and the methods of calculating gearing for odd and even pitches are simplified in great measure. The price is 25 cents.

"Points for Buyers and Users of Tool Steel," by George W. Alling, is a plainly written treatise that in every particular is suggestive of the shop. Many facts of common knowledge among expert mechanics are repeated, but this is inevitable and the work is well stocked with information and the argument enforced with numerous instances of the success or failure following the different methods of heat treatment. A number of the illustrations are very good and show fractures and surfaces with great distinctness, but a few of the cuts are less worthy of praise. The work is written by a man who understands and his pithy paragraphs at the close of the book summarize quite a little philosophy. The book is 5½ x 8 inches, cloth bound, and has 224 pages. The David Williams Co., of William street, New York. Price, $2.

"A Treatise on Friction and Lost Work in Machinery and Millwork" is one of the best known books of the late Robert H. Thurston, and has recently progressed to a seventh edition. A considerable amount of new material appears and the work has been brought to a level with recent research by the addition of a summary of progress. Some of the data relate to the high speed work of electrical apparatus and turbines, having therefore peculiar interest at the present time. The volume is 6 x 9 inches and has 430 pages, with 77 illustrations. John Wiley & Sons, East Nineteenth street, New York. Cloth bound. Price, $3.

"Machine Design," by Forrest R. Jones, appears with a revised and enlarged edition of Part 2, which deals with the form, strength and proportion of parts. Part 2 has a number of useful additions; thirty-two pages are now devoted to roller and ball bearings; considerable space has been given to belt drives and several new problems solved; diagrams have been added for rapid solution of belt drive problems and worm and wheel mechanism receives more space for additional examples from practice. The book has 426, 6 x 9-inch, pages and 243 illustrations; cloth bound. Price, $3. John Wiley & Sons, East Nineteenth street, New York.

"Free-Hand Lettering," by Victor T. Wilson, treats of such plain lettering as may be advisable in engineering drawings, and the author has a series of illustrations evidently reproduced from pen sketches. These are not only excellent specimens of technical skill, but point out the path by which the result was reached. Whatever one may think of the author's theories, his examples work out in very attractive forms with but few exceptions. The handling of the instruments and choice of pens, ink and paper are explained minutely, with a number of practical suggestions on design, spacing and other details of lettering. The volume has 95, 6 x 9-inch, pages and 13 full-page plates. Price, $1, cloth bound. John Wiley & Sons, East Nineteenth street, New York.

CHICAGO METAL MARKET.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK Jan. 5.

Little change is to be noted in the demand for metals. Prices are about the same, though tin and copper are somewhat firmer. Buyers are covering for their requirements in small lots, season contracts being conspicuous by their absence. It is expected by the pursuance of this policy to bring prices down, but thus far it has been unsuccessful, though it has been followed for several months. Quotations on Lake copper, carload lots, Chicago, are 12⅝c, and in small lots, 13c to 13½c; casting, carload lots, 12⅜c; smaller quantities, 13c to 13¼c. Tin is quoted at 29½c in small lots. Pig lead, 4.32½c in carloads, and 4¾c in lesser lots. Spelter, 5c carloads, and 5¾c to 6c for small lots. Antimony, 7¼c for Cookson's and 6½c to 6¾c for Hallett's in small quantities. Nickel is 45 to 60c, according to amount and deliveries.

The demand for old metals is improving in sympathy with the tone in new metals. We quote dealers' selling prices as follows: Copper wire, $10.75; copper, heavy, $10.50; light copper, $9.50; red brass, $9.50; red brass turnings, $8.00; yellow brass, $7.00; yellow brass turnings, $6.00; lead, $3.75; zinc, $3.25.

The S. Obermayer Co., of Cincinnati, recently sent out an interesting souvenir—a large sheet containing portraits of its officers and representatives in various foundry centers, 19 faces in all.

Cleveland Machinery Market.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Jan. 5.

At the close of the old year, a number of Cleveland manufacturers were asked briefly to review business conditions as they found them in 1903, with their opinions as to prospects for 1904. While nearly all who are willing to be quoted take a cheerful view of conditions and prospects, some, who are not optimistic, prefer not to participate in the symposium. The Standard Welding Co. believes that the experience of 1903 has taught the manufacturers not only of Cleveland but of all the eastern part of the country, caution. An officer of the company says:

"In a general way the manufacturing interests of Cleveland have been conservatively conducted, and are now on that basis, but many manufacturers have been more or less infected by the feverish activities of the last three or four years, but not in such a way, in the writer's judgment, as to prejudice their business. In our opinion the prospects for 1904 are fairly good. The demand will be regular and moderate; no buying on speculation. The tendency of most steel products downward will have that effect and if we are able to maintain fairly good labor conditions as we have in the past year, we see no reason from the present outlook why 1904 should not be a good year."

The year just closed completes the first full one of the National-Acme Mfg. Co. in its new plant. The result of the last twelve months' work is very gratifying. The demand for machines has continued good throughout the period, so much so in fact, that the company has added to its plant considerable additional equipment, enabling it better to meet the demand. The call for cap and set screws and for special product has been in excess of former years, necessitating an increased equipment in that department also. The December trade has been lighter than for the months preceding it, as is always the case owing to inventory and the closing of the year's business. Indications are, that conditions will continue good during the coming year, with possibly a slight shrinkage, owing to the excitement and agitation usually in evidence in presidential years. There seems, in the opinion of this company, to be little or no feeling of uncertainty as to the results in November, and with this condition continuing it looks for very little retrenchment in trade from the "cause political."

The Electric Controller & Supply Co. states that while it does not look for as prosperous a time as it had in the first half of 1903 yet it expects very fair business for 1904.

Foote, Burt & Co. believe that things have turned for the better. December was considerably ahead in new orders over November. November was ahead of October. They have every reason to believe January will do as well, at least, as December. Inquiries from concerns which they know are going to buy soon are on the increase.

The Cleveland Twist Drill Co. reports in its line: Business for 1903 has been exceedingly satisfactory. The demands for its goods all through the year have been brisk, and at many times in excess of its ability to supply the goods. There has been as usual at this time of the year a marked falling off in orders during December. The company has taken advantage of this annual letting up of business to take inventory and make all necessary repairs for a good run for 1904. It believes that as many labor troubles have been settled and there is less aggressiveness on the part of labor unions, 1904 should be a good year for all manufacturers in the tool or machinery line.

The year 1903 has been the most successful year of the Cleveland Pneumatic Tool Co. Had it not been for the great slump in the iron and steel business, the year 1903 would have far exceeded its most hopeful expectations in trade. An officer of the company writes: "Standing on the threshold of the year 1904, we cannot help taking an optimistic view regarding what it may bring. The bulls and bears of Wall street have had their innings. The country has suffered from the unhealthy, promoted industry, and legitimate manufacturers have suffered to some extent, but we see nothing for any legitimate manufacturing concerns carried on along the lines of high commercial honor, that should prevent the coming year to be one of prosperity to all such concerns. The country is richer than ever before, and if we do not have good times it will be an under-consumption rather than an over-production. We hope to see organized labor take the correct view of conditions and accept the situation as it is. We do not anticipate that there can be anything that will look like a change in the administration of this country. It is sure to be carried out along the same lines the next four years that it has for the past eight."

The Kirk-Latty Mfg. Co. reports that it has had a prosperous year during 1903, and is extremely well satisfied with its outlook for 1904. The company believes that conditions are steadying to a large extent, and that a satisfactory volume of business will be done during the present year.

The Chisholm & Moore Mfg. Co. states its business for the year 1903 was most satisfactory. The company believes that in 1904 there will be a large trade, but possibly not quite so large as the year just closed. Prices will be lower and margins necessarily closer. There is every indication with this company that as soon as merchants are through with stock taking, and making up their yearly accounts, it will again receive liberal specifications from them for goods in its line.

The Marshall & Huschart Machinery Co. reports that business has been satisfactory and that it has many inquiries on its books which it has reason to believe will be closed in the near future.

The Elwell-Parker Electric Co. writes: "Our business for 1903 was good, but new orders fell off sadly during the last three months of the year. On the other hand, inquiries and prospective contracts that appear to be all but certain to become facts early this year, were quite as good last year as at any time during the last four years. Our conclusion, therefore, with respect to the current year is that we shall do a good business and we judge that the business for 1905 will be even better. On the other hand, we do not look for an immediate return of the feverish and unusual activity that has maintained for the last four years. We think business will be good but of a more sober character and we think further, that buyers and builders of new plants who are in an easy financial condition, will soon be placing considerable orders for the year for the reason that present prices are so much lower than those maintained a year ago."

Concerning the incorporation of the Attwood Chain Works, Lebanon, Pa., mentioned last week, the company makes the following statement: "Mr. Attwood has purchased the Lebanon Chain Works from the Standard Chain Co., and the new concern will be conducted under the name of the Attwood Chain Works until the Standard Chain Co. abandons the name of the Lebanon Chain Works, when application will be made for a charter of that name. All rights pertaining to the new link bending machine, of which Mr. Attwood is the patentee, were included in the sale, enabling this plant to cater to the trade for side welded chain, up to and including iron of 3½ inches in diameter. We manufacture all sizes from ¼ inch to 3½ inches in thickness, the output being high class ship's cables, dredging chains, crane, mining and rigging chains, differential pulley blocks, chains, etc."

A meeting of freight agents of the territory of the Central Freight Association was held in Cleveland Jan. 5 to consider rates on pig iron in Ohio and Eastern Indiana. Rates on shipments in territory tributary to Toledo and Cleveland, which have not been entirely uniform, were revised, subject to approval by the association. The new rates will not be announced until they are so approved.

Some departments of the Miller Gas Engine Co., Springfield, O., have shut down, throwing 90 men out of employment.

Philadelphia Machinery Market.

PHILADELPHIA, Jan. 4.—The closing month of the old year was inconspicuous as far as volume of business is concerned. While the business done was quite on a par with that for the preceding month it was of an unimportant nature and anything but indicative of an improved demand. Among the machinery builders, however, a much better feeling has developed, and there appears to be confidence in most circles that an improvement in demand will be noticed before the new year is many weeks old. This belief is based upon the number of inquiries coming in for machinery of all kinds, from foreign as well as domestic sources. A large portion of these inquiries covers machine tools and equipment. The recent improvements made by various manufacturers of tool steels in the direction of high speed cutting steels are in some measure contributory to the prospect of a stimulated demand for tools. Lathes are being called for of a type much more powerful than have hitherto been considered necessary, and in consequence there is considerable redesigning going on to meet the changed conditions. This would indicate that 1904 will see the discarding of large numbers of tools in favor of newer types possessing the desired economic features.

Taken altogether, the outlook for the next six months is rather cheerful. Today prices are firm. Labor is quiet, having attained about all that it is possible to attain. Some reduction in wages may be considered necessary in the spring, and if employes will meet the condition in the proper spirit there appears to be no reason why the machinery business should not reach a normal condition by midsummer. A good many unemployed machinists are in evidence, but the majority of them are not of the highest efficiency and such as can only obtain steady work when business is good.

In foundry circles complaint is heard in regard to the demand for castings, some establishments being anything but busy. Others have sufficient work in hand to last two or three months. The competition for orders is keen, but prices of castings are fairly well maintained.

Inventory taking is in progress in establishments whose business year ends with the calendar, but few plants are shut down entirely for this purpose.

Much interest is always shown in the annual statement as to product given out by the Baldwin Locomotive Works. The year 1903 is described as being the most successful in the history of the plant, records for all preceding years having been completely eclipsed. The number of complete locomotives turned out during the year was 2,022, an increase of 33 1-3 percent over the output of 1902. In addition duplicate and repair parts of locomotives were furnished in quantity sufficient to equal the building of about 250 complete locomotives. Of the number completed 300 were of the compound cylinder type, 85 were operated by electricity, and 6 by compressed air. In all 1,966 locomotives went into service in the United States, and the balance were shipped to foreign countries. The value of the year's output approximates a figure between $27,000,000 and $28,000,000. The plant continues active in all departments, and in Philadelphia furnishes employment for upwards of 16,000 hands. There are enough orders on the books to insure a continuance of present conditions for many months.

The Eynon-Evans Mfg. Co., maker of engineering appliances and fittings, reports a fairly good year. The company has taken advantage of the recent lull to complete some of its projected improvements. It has installed a convenient elevator service for carrying sand, metals, etc., from storage into its foundries. The different departments have all been equipped with electric power, each independent of the other. In the power plant additional installations comprise a 125-h. p. Harrisburg standard engine and a General Electric Co.'s 75-k. w. generator. There has also been installed a cross compound air and steam compressor built by the Herron & Bury Mfg. Co., of Erie, Pa. In the new foundry building there has been installed an electric traveling crane built by Alfred Bros. & Co., Philadelphia. The company is receiving numbers of inquiries and orders and expects to do a good business during the first six months of the year.

E. L. Martin, agent for the Union Steam Pump Co., Battle Creek, Mich., reports some good sales during the latter half of December, and a good prospect for the early months of this year. Among the orders taken he mentions one from the Bonnyville Cement Co., Siegfried, Pa., for a 1,000,000-gallon pumping outfit, and another from the Richmond Cedar Works, Richmond, Va., for an 8 x 9 x 12 vacuum pump, and a 4 x 3½ x 5 low duty pump.

Edward Harrington & Son Co., builder of machine tools and hoisting appliances, reports a fair condition of business and inquiry good. The company's new five-story building at 17th and Callowhill streets is rapidly approaching completion and will be one of the most complete buildings for the purpose of machine tool building in this section. The company will commence the removal of the present plant in about six weeks. No additional machinery will be installed except of its own make. The power plant is already installed.

The Forbes Co., builder of steam water sterilizing apparatus, is quite busy on orders for its appliances. It is making a specialty of water purifiers for manufacturing plants, to purify the drinking water for employes. A very neat equipment has just been installed in the Philadelphia plant of the Link Belt Engineering Co. The company is meeting a good demand for its apparatus from railroads, public institutions and large plants appreciating the value of sterilized drinking water.

The Wilbraham-Green Blower Co., builder of rotary pressure blowers and exhausters, reports a good year's business, and contiues fairly busy at its plant. During December shipments aggregated a considerable tonnage, and included some large blowers, motor drivers, with the drive on the same bed plates.

The Earle Gear & Machine Co., a concern which started in business as recently as Nov. 1 last, reports a good business so far, and an excellent prospect for a good trade in 1904. It is occupying commodious quarters in a new building on Oxford street, west of Front street. A specialty is made of gears in steel, iron and bronze, in sizes 1 inch to 12 feet. The company is also equipped for supplying the needs of the trade in worm gearing. It is booking a good many orders for rawhide gears, a line to which it is paying especial attention. In its process of manufacturing hide gears the company claims very little composition is used, the gears being practically all hide and consequently wearing long under service. It is just adding a 72-inch spiral gear cutter and two heavy bevel gear planers. It will shortly place upon the market a new line of machine tools. The officers of the company are: Edgar P. Earle, president; Robt. J. Snyder, secretary; and Frank D. Hammond, superintendent.

I. H. Johnson Jr., Co., builder of lathes, shipped a number of tools during December, but all of a small type. It has a number of large tools completed, shipment of which is delayed on account of the non-receipt of motors forming part of the driving systems. The company has some good orders booked and enough work in hand to keep its plant busy for some time. The new year has opened auspiciously and the indications are that a good business will result during the first half of the year.

The Hess Machine Works, builders of file making machinery and special machinery, are fairly busy and have some good orders in hand. They have just made shipments of file making machines to France, England and Belgium. They report the outlook good and inquiry very satisfactory.

The Falkenau-Sinclair Co. reports December business fair, but its shipments were confined to standard presses of small capacities. It booked some good orders during the month and says that the business outlook so far as it is concerned is encouraging. It is quite busy in its testing machine department, mainly on cement testing machines. It has just shipped from this department a 50,000-ton vertical screw testing machine to the University of Pennsylvania.

The Newton Machine Tool Works are meeting a fairly good demand for their productions and report inquiry strong. Orders during December covered mainly tools small in character. Their shipments included a combined cold saw and rotary planer to an Eastern concern, and two motor boring machines for railroad work, one to the West, the other to Europe; also several portable machine tools on foreign orders. They are at present working on several new types of tools, among them a six spindle vertical drill, a new milling machine and a new rotary planer. They have enough orders on their books to keep them busy for three months to come.

THE NEWCOMEN AND OTHER EARLY ENGINES.

A paper of considerable value from even a purely historical point of view was presented at the recent meeting of the Institute of Mechanical Engineers. It dealt with the researches of Mr. Henry Davey and other members into the past of the Newcomen engine and the recital and discussion of the data presented were noteworthy. The photographs and reproductions of drawings of the steam engines of a century ago make an interesting array, in the light of the means then and now employed for the production of such machines. Frequently the inventor cares little or nothing for the manufacturing details consequent upon the adoption of his device. That part of the undertaking can in many cases be transferred to another and in all probability a specially equipped workman for the purpose. But a century ago, and for that matter at even a much later date, the inventor was driven to a narrow choice of material in both men and metals. The cylinders were of brass, the connecting pipes of lead and many of the levers and other parts were of wood. A description of the Newcomen engine of that day was published by Emerson in 1758 and is so clear that the following extracts will serve without engravings:

"The fire engine to raise water has a great beam or lever, about 24 feet long, 2 feet deep at least, and near 2 feet broad. It lies through the end wall of the engine house, and moves round a center upon an iron axis. The steam cylinder is of iron, 40 inches in diameter or more, and 8 feet or 9 feet long, the piston sustained by the chain. The fireplace is underground. The boiler is 12 feet in diameter, which communicates with the cylinder by a hole and throat-pipe 6 inches or 8 inches in diameter. The boiler is of iron and covered over close with lead, in this the water is boiled to raise steam. The regulator being a plate within the boiler which opens and shuts the hole of communication, this is fixed on an axis coming through the boiler, on which axis is fixed a horizontal piece called the spanner, so that moving the spanner back and forward moves the plate over the hole and back again. There is a horizontal rod of iron movable about a joint, and a piece of iron with several claws called the wye, moving about an axis in a fixed frame."

"The claw is cloven, and between the two parts passes the end with two knots to keep it in its place. There is the working-beam or plug-frame in which is a slit, through which the claws pass and are kept there by a pin going between them. There is a leaden pipe called the injection pipe, carrying cold water from the cistern into the cylinder, and is turned up at the end within the cylinder. To the injection-cock is fixed an iron rod lying horizontal. The end goes through a slit in the end of another piece, and on the end is a knob screwed on to keep it in place. There is a piece of iron with several claws called the 'eff,' movable about an axis. The claw goes through the slit in the plug frame and is kept there by the two pins; the claw goes over the piece. As the piece is moved back and forward, the injection cock opens and shuts. There are several holes in the plug frame that by shifting the pins serve to set the pieces higher or lower as occasion requires. There is the snifting clack balanced by a weight and opening outwards to let out the air in the cylinder at the descent of the piston. In some engines a pipe goes from it to convey the steam out of the house. There is a leaden pipe called the sinking pipe or eduction pipe going from the cylinder to the hot-well, it is turned up at the end and has a valve opening upwards, this carries away the water thrown in by the cold-water pipe, or injection pipe. There is the feeding pipe, going from the hot-well to the boiler, to supply it with water by a cock opening at pleasure. There are two gauge pipes with cocks, one reaching a little under the surface of the water in the boiler, the other a little short of it. By opening these cocks, it is known when there is water enough in the boiler, for one cock will give steam and the other water, they stand in a plate which may be opened for a man to go into the boiler to clean or mend it. There is the puppet-clack or safety-valve, from this a wire comes through a small hole to which is fixed a thread going over a pulley, with a small weight at it, the weight on the clack is about 1 pound for every square inch. There is a steam-pipe going from the clack out of the house. When the steam in the boiler is too strong, it lifts up the puppet-clack and goes into the steam-pipe by which it is conveyed away, otherwise the boiler would burst. There is a pipe carrying water from the cistern into the cylinder to cover the piston to a good depth, also a cock opening to any wideness that the water may run in a due quantity, and a hole to let it out, through a pipe into the hot-well when there is too much. There is a force-pump, with a bucket and clack, and two valves opening upwards. This pump is closed at the top, and being wrought by a lever it brings water out of a pit into a cistern for supplying condensing water. There are speers (spears) which work in wooden pumps within the pit. The cylinder is supported by strong beams going through the engine-house. There is the first floor and the upper floor. At the end of the beam there are two pins, which strike against two springs of wood, fixed to two timbers or spring beams lying on each side the great lever, these pins serve to stop the beam and hinder the piston coming too low in this cylinder."

During the discussion of the paper a Birmingham engineer said that in Clifford's rolling mill in Fazley street, in that city, there was an old engine, having a cylinder, 4 feet in diameter, with a stroke of 9 feet or 10 feet. This engine had a wooden beam built up of timber sections and a wooden connecting rod. It drove the rolling mill for 95 years for about 10 hours a day, the cost of repairs being immaterial. The speaker had taken some diagrams from it, and had weighed out the coal for a day. So far as he could recollect, the consumption worked out at about 7 pounds of slack per indicated h. p. per hour. The users of this engine, wishing to know whether it would pay them to take it out and put in a more modern one, sought his advice. He was convinced that when the cost of removing the old engine and putting in a new one was taken into account, there would be practically no gain, as the saving in coal would not pay 10 percent on the outlay. The engine therefore remained, he believed, to the present time, although the old wooden beam was taken out and an iron one substituted. It was curious to hear the old beam groan and creak when it was at work; but it had done its work well for 100 years. He did not think that the difficulty that Newcomen, Boulton and Watt, and others had, in those old days, in making engines of the size they did, was sufficiently realized. When it was considered that these people made cylinders 66 inches in diameter, with a 10-foot stroke, and the difficulties that arose through the absence of lathes to bore them out, the perseverance with which they must have gone to work would be appreciated. The speaker had once had the privilege of looking through the old Boulton and Watt correspondence, and the old James Watt drawings at Messrs. Tangye's works, and had seen a letter from Boulton to Watt, in which the writer said that he had just succeeded in making a cylinder for a steam-engine nowhere more than ¼ inch out of truth. This was an achievement for which Boulton considered he ought to be congratulated. The cylinder was 5 feet in diameter and 10 foot stroke. The method of forming the inside of the cylinder was as follows: The cylinder was laid on its side in the yard, and a plug of lead was cast inside it, which would weigh from 200 to 300 pounds. This plug had an iron staple through the middle. A pail of emery and oil was poured in. Two chains were fastened to the staple, and four or five men pulled this lead plug backwards and forwards along the internal surface of the cylinder. In this way, by means of the emery and oil, it was scoured bright. The cylinder was then turned over, and another portion was operated on in the same way.

W. G. Norris of Coalbrookdale submitted some old records from the journal of the plant there. Several extracts are taken from his paper: "With the increase in the size of the cylinders an important practical difficulty connected with the boring began to be experienced from the frequent breakage of the boring bars. It was desired in 1734 by the managing partner, Richard Ford, to have for this purpose 'a wrought-iron spindle, 12 feet long and full 3 inches in diameter; one end to be left square for 18 inches, and ye other end to be left square for 6 inches, and the remaining 10 feet to be left round, but to be as true as may be, and to be made of right tuff iron and right sound.' This was ordered from an anchor-smith in Bristol, and supplied at a cost of £26 10s. (about $125) in September, 1734. Another one was obtained in 1745, "c 5.3.15 @ 8d. per pound. £21 19s. 5d." The motive power for the blowing apparatus for the blast furnace, and for any machinery in the works at Coalbrookdale, was the water from the brook

which runs through the valley in its course to the Severn, and which necessarily was a variable supply. In order to utilize the limited quantity in the drier periods, it was decided in 1743 by the then active partner, the second Abraham Darby, to erect an engine to pump back the water which had passed over two or more water wheels to the reservoir from which it had first issued, to make it proceed on its course of labor again. The difference in level from and to which the water was raised was about 120 feet. The dimensions of the cylinder and of the pumps have not been preserved. The total cost, as upheld in the year's accounts for 1745, appears to have been for—

	£	s.	d.
"Cylinder, working barrels and cast-iron articles.	307	18	7
Brass work and lead	108	14	1
Plate iron and bricks	70	15	8
The oak regulating beam	10	15	0
Various labor in, and with the erection and the pit	356	0	3
	834	3	7

"Similar engines for the same object were subsequently erected at the other works belonging to the concern at Horsehay in 1754, with cylinders 10 feet by 47¾ inches, and in 1756 with cylinders 10 feet by 60 inches, and at Ketley, about the same years, with the same sizes of cylinders. With the Coalbrookdale engine the experiment was made of using spelter in place of brass for the working barrel of the pump, either entirely or as lining for an iron pipe. A second working barrel of the same size was sent with some engine work into Cornwall, but was quickly returned. The size of the working barrel was 9 feet long by 8¼ inches diameter, and the weight of spelter in each was 896 pounds. The application of a pumping engine to return water for recurring use by the waterwheel was subsequently adopted at several furnaces in England and Scotland because of the advantage of a continuous blast upon the furnace.

"After 1750 notices of 'engine plates,' or 'boiler plates,' are more frequent. They were all hammered under a 'plating' hammer from slabs or moulds. They seldom exceeded 56 pounds each. It was not until after 1790 that boiler plates about 4 feet by 8 inches by ½ inch were rolled at the Coalbrookdale Co.'s works at Horsehay, and no other works in Shropshire then made them."

Southern Pig Iron Conference.

The meeting of representatives of Southern furnaces held at Birmingham, Ala., Dec. 29 and 30, to canvass the possibilities of a new association or a form of agreement that would maintain prices above the cost line, adjourned without reaching a conclusion on the matter. While some Southern companies are not favorable to a revival of the old association, there is an effort to secure the adoption of a different form of agreement. A committee consisting of W. H. Hassinger, of the Republic Iron & Steel Co., C. E. Buek, of the Lacey-Buek Iron Co., J. W. McQueen, of the Sloss-Sheffield Steel & Iron Co., and Mr. Darst, of the Virginia Iron, Coal & Coke Co., was appointed to formulate a plan for submission to the various interests. It seems quite certain that no association will be formed unless it can be made to include a larger number of producers than affiliated with the last one.

PERSONAL.

B. F. Harper has resigned from the Republic Iron & Steel Co. and has accepted a position as special agent for the Carnegie Steel Co. with headquarters for the present at the Cleveland office. He will work directly under H. P. Bope, general manager of sales, Pittsburg, but in conjunction with all local agencies in the territories in which he will operate.

L. C. Bihler, who became traffic manager of the Carnegie Steel Co. on Jan. 1, had been for several years assistant to Geo. E. McCague, his predecessor. He began railroad work with the Erie road as stenographer and later took service with the Cotton Belt route, from which he resigned in 1895 after seven years' service to become connected with the Carnegie Steel Co.

P. H. Galvin has been placed in charge of the labor and transportation department of the Republic Iron & Steel Co., Youngstown, O. Mr. Galvin had been in the transportation department of the company for some time.

Samuel W. Gardner succeeded John T. Gardner, his brother, on Jan. 1 as the superintendent of the rolling mill department of the Ohio plant of the Carnegie Steel Co. John T. Gardner has retired from active business and will go to his farm at Walkerston, Ind., to live.

C. H. Matthiessen has resigned as managing director and chairman of the executive committee of the Chicago Pneumatic Tool Co. It is said that his duties as president of the Corn Products Co. require all his attention. His personal representative in the tool company, Sherman W. Prince, remains as secretary and treasurer. J. W. McGinley, of Pittsburg, succeeds Mr. Matthiessen as chairman of the board.

Wm. M. Carr has severed his connection with the American Steel Foundries as chief chemist and metallurgist for the St. Louis district.

Walter Scranton, president of the Lackawanna Steel Co., Buffalo, has resigned and will be chairman of the executive committee of that company. His successor has not been announced.

Joseph F. Hayes, chief engineer of the Pittsburg Steamship Co., has resigned to become chief engineer of the fleet of A. B. Wolvin, former manager of the company. His successor has not been announced. W. E. Gaynor, purchasing agent of the steel corporation fleet, has resigned.

Theodore S. Clark, vice president of the Sharon Steel Hoop Co., has resigned. His successor has not been chosen. He will retain his interest in the company and remain in the directory.

Rogers, Brown & Co. announce the admission to their firm on Jan. 1 of Arthur A. Fowler, of New York City. Mr. Fowler for some years has been head of the grain commission firm of A. A. Fowler & Co., Produce Exchange, New York. He will connect himself with the New York office of Rogers, Brown & Co.

The Western Society of Engineers held its 34th annual meeting and dinner at the Sherman House, Chicago, Tuesday evening, Jan. 5. Several prominent gentlemen were invited to be present as guests of the society.

AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS AT PITTSBURG, 1903.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Bessemer Pig Iron	$ 22.35	$ 22.35	$ 22.00	$ 21.60	$ 20.00	$ 19.85	$ 19.00	$ 17.85	$ 16.85	$ 15.85	$ 15.25	$ 14.35
No. 2 Foundry Iron, Northern	22.00	22.25	22.50	21.75	20.75	19.75	17.75	16.50	15.25	14.50	14.25	14.10
Gray Forge Iron	21.00	21.00	20.75	20.35	20.00	19.50	17.50	15.50	14.65	13.75	13.00	13.25
Bessemer Billets, 4x4 inches	29 75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00
Beams and Channels, 3 to 15 inches	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c
Tank Plate	1.60c	1.60c	1.75c	1.75c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c
Steel Bars	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.30c	1.30c
Bar Iron	1.80c	1 84¾c	1.84¾c	1.84¾c	1.89¼c	1.84¾c	1.75¾c	1.64¾c	1.49¾c	1.39¾c	1.34¾c	1.34¾c
Muck Bar	33.00	34.00	35.00	35.00	34.50	34.00	32.00	30.00	29.00	27.50	27.00	25.00
Iron Skelp	2.00c	2.00c	2.05c	2.10c	2.10c	2.00c	1.90c	1.80c	1.70c	1.65c	1.50c	1.50c
Steel Skelp	1.95c	1.92½c	1.92½c	2.00c	2.00c	1.95c	1.85c	1.75c	1.65c	1.60c	1.45c	1.45c
Rails	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Wire Nails	1.90	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.95	1.90	1.85
Iron Cut Nails	2.20	2.20	2.20	2.25	2.25	2.25	2.25	2.25	2.25	2.05	2.00	1.90
Sheets, No. 28	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.70c	2.70c	2.65c	2.60c	2.35c	2.35c
Tin Plate	3.60	3.60	3.80	3 80	3.80	3.80	3.80	3.80	3.80	3.80	3.60	3.60
Ferro-Manganese	50.00	50.00	50.00	50.00	50.00	50.00	49.00	49.00	49.00	48.50	47.50	46.00
Spelter	4.85c	5.00c	5.30c	5.55c	5.65c	5.70c	5.65c	5.75c	5.75c	5.65c	4.90c	4.60c
Furnace Coke at Ovens	4.50	4.50	4.00	3.75	3.50	3.00	2.50	2.00	2.00	1.90	1.90	1.75
Foundry Coke at Ovens	6.50	6.00	5.50	5.00	4.50	4.00	3.00	2.75	2.75	2.65	2.65	2.35

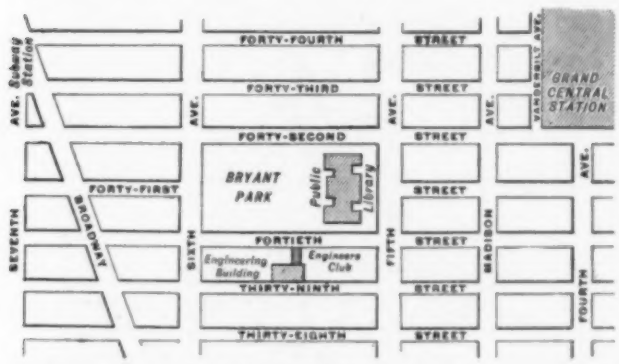
THE CARNEGIE GIFT TO ENGINEERING.

The representatives of the American Society of Mechanical Engineers on the joint committee of engineering societies on the Carnegie engineering building project have submitted a report from which the following extracts are taken:

During the interval between the report at Saratoga to the American Society of Mechanical Engineers and the recent meeting, the joint committee of fifteen has been in conference and has appointed an executive committee of five to facilitate the work. A sub-committee has been engaged in the preparation of the material which might be necessary to submit the needs of these societies to a competition of architects, as to the structural details of the building. A committee on organization has been appointed, consisting of Messrs. A. R. Ledoux, Chas. Wallace Hunt and S. S. Wheeler, and their recommendations to the joint committee have been adopted and the organization committee instructed to take the necessary preliminary steps to secure legislative action.

The committee on organization was appointed at a meeting of the executive committee of the Union Engineers' Building Association, on July 9, 1903, and was instructed "to propose a plan of organization for the bodies exclusive of the Engineers' Club, which are to participate in the gift." In transmitting instructions to this committee, the chairman of the executive committee summarized its duties, as follows:

1. To suggest an organization to hold title to the land, and building.



THE LOCATION OF THE UNION ENGINEERING HOUSE IN NEW YORK CITY.

2. A method of superintending and administering the building after completion.

3. Provision for granting the use of parts of the building to other organizations whose objects and work may be of suitable character and which may contribute to the maintenance of the building.

4. Provision for contingencies, such as the withdrawal of one of the societies, or the failure on the part of any one properly to carry out its obligations.

The committee has held several meetings and has informally consulted members of the American Society of Civil Engineers, and others interested.

When the sub-committee on building plans took up the consideration of the necessary areas it developed at once that the cost of the building which would be required for the accommodation of the engineering societies, on 125 feet front on Thirty-ninth street, and the Engineers' Club on a 50-foot front on Fortieth street, would exceed the preliminary or tentative figure mentioned by Mr. Carnegie in his official letter of gift.

When this conclusion was reached, a special committee was appointed to visit Mr. Carnegie and talk the matter over with him. He made it evident that it was his desire and intention to erect a building which should be a monument to the engineering profession, and that it was his purpose to make this building adequate and the question of cost was in his mind secondary to the attaining of the object dear to his heart, which was the bringing together of all classes of engineers into a building in which they could co-operate for the common purpose of the profession.

The New York Public Library building occupies the entire eastern frontage of the block between Fortieth and Forty-second streets on Fifth avenue, while to the westward is the open square known as Byrant Park. It will be conveniently accessible from the terminals of the New York, New Haven & Hartford railroad, and the New York Central & Hudson River railroad at Forty-second street, at Park and Madison avenues, and from the Pennsylvania terminals coming in from the west,, at Thirty-third street and Seventh avenue. The elevated railway at Sixth avenue has a station at Forty-second street, and the Third avenue elevated, Forty-second street and Park avenue. The junction of the Rapid Transit underground lines at Forty-third street and Broadway will make this station an important express point for trains both from down town and from the north. Convenient surface lines, both up and down town, intersect at Forty-second street. The hotel and theater district of the city are centering more and more around this particular region.

The committee reports that for the three societies which have so far signified their purpose to make use of the proposed building, the requirement of floor space in square feet, outside of the general rooms for auditoriums and library needs, is as follows: Electrical, 5,200; mechanical, 5,500; mining, 5,120. The Society of Civil Engineers has issued a circular to its members reporting the condition of affairs at the present time and its probable need for 9,000 square feet of floor space, but definite action cannot be taken by that society until a letter ballot is had and until after the annual meeting in January. In the letter ballot taken on the question of the necessary changes in its by-laws by the American Institute of Mining Engineers, the vote showed over 1,600 in favor of the change, and only 11 in opposition. The action in the joint committee on all questions which have been submitted to it has been unanimous, and throughout, in all decisions, the joint committee has had the benefit of the counsel, advice and co-operation of the representatives appointed by the American Society of Civil Engineers, who have sat with the committee in all its deliberations.

A New Melting Furnace.

Harry D. Harvey, Nos. 5 and 7 West Lombard street, Baltimore, Md., is manufacturing a new melting furnace, which burns crude oil, though gas may be used if so desired. The furnace consists essentially of an iron casing lined with a refractory material, inside of which is supported the crucible; the latter rests on a graphite support and is so situated that the burning gas or oil surrounds all sides of the crucible, but the products of combustion do not come in contact with the molten metal. A special burner mixes the fuel and air in the proper proportions. The entire casing is supported by trunnions and when the metal is melted the furnace is tipped and the contents of the crucible poured into a ladle for carriage to the molds. The manufacturer asserts a very low fuel cost per pound of metal melted, and also claims that the furnace possesses special advantages on account of the fact that the metal is not in contact with the products of combustion. The furnace is said to have melted in actual foundry practice 100 pounds of metal with 1½ gallons of crude oil. Another advantage claimed is that the crucible is always contained within the furnace and is not subjected to as sudden variations of temperature as would be the case if lifted out for pouring; hence the working life will be proportionately increased.

The Ober Mfg. Co., Chagrin Falls, O., recently incorporated, succeeds the partnership heretofore doing business under the name of Ober Mfg. Co. The company does not expect to do any building or make any changes of any kind at present. It has a great many orders on its books and looks for a fair trade next year. It manufacturers sad irons, wood handles and machinery for turning handles, spokes and variety work.

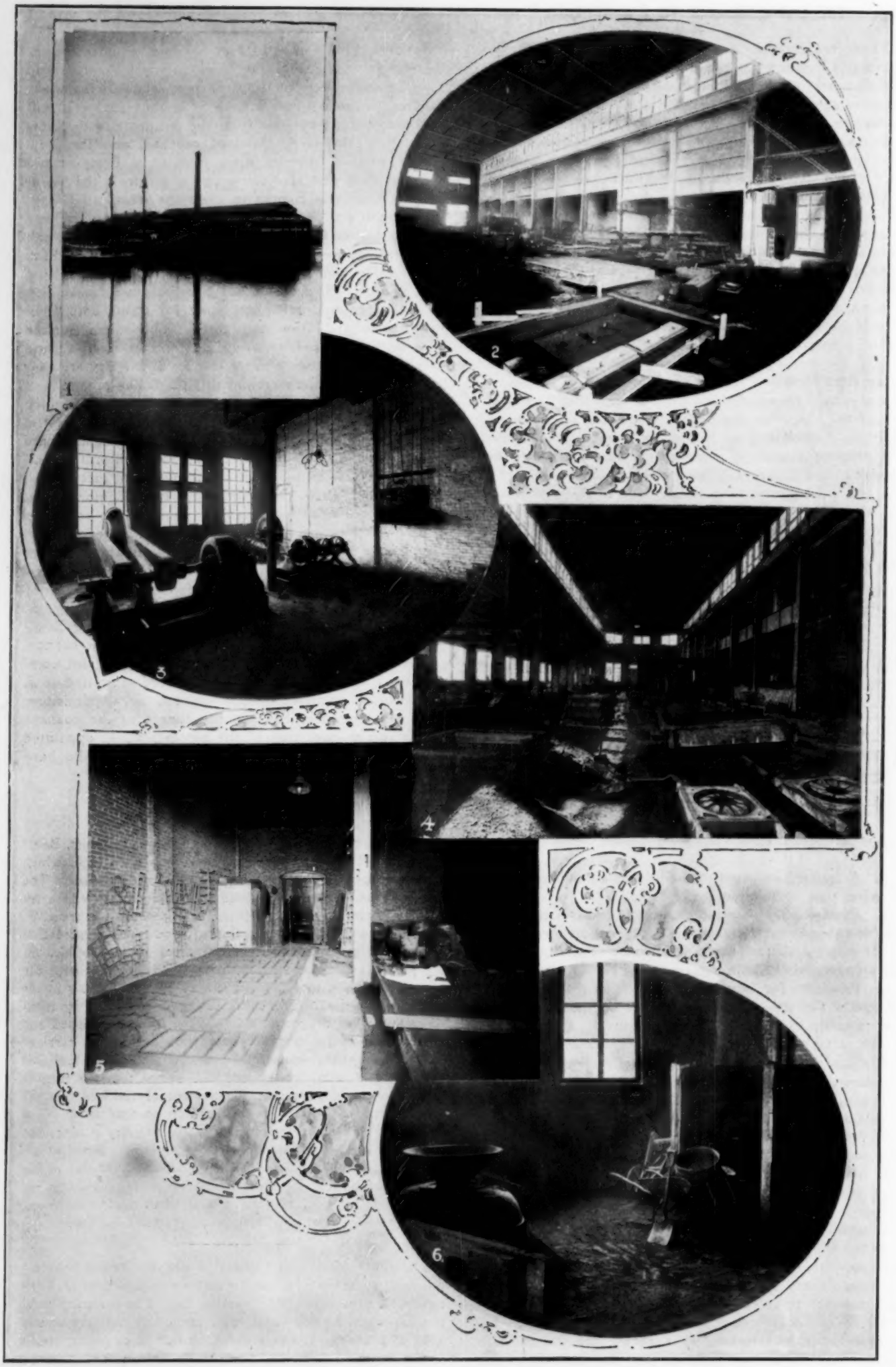


FIG. 1.—GENERAL VIEW OF PLANT.
FIG. 2.—CORE DEPARTMENT.
FIG. 3.—BLOWER ROOM.
FIG. 4.—THE FOUNDRY.
FIG. 5.—BEDS FOR CORE IRONS AND LOAM TOOLS.
FIG. 6.—FACING SAND DEPARTMENT.

The Works of the Marine Engine & Machine Co., at Harrison, N. J.

The Marine Engine & Machine Co., of Harrison, N. J., is the successor of the Marine Vapor Engine Co., the latter firm building launches and similar pleasure craft complete with motive power. The engines and generators used alcohol vapor; hence the derivation of the old company's title. The development of the business from the one specialty in combination with the numerous details incident to the jobbing progress of a well equipped machine shop and foundry on the river front in a busy neighborhood made the firm name inappropriate. Under the present management, elevators, ice machines, stationary and marine engines, acetylene gas plants, and special work of great variety are undertaken. Boat building is no longer followed at the shops though the facilities for handling vessels are still found of great assistance in such marine work as arrives for repairs, etc. Proximity to the river front and water entrance to the machine shop on a but little lower level than the shop floor at high water permits the service of the crane indoors for raising machinery from hulls, installing motive power and in other ways.

The general arrangement of the plant as seen from the Passaic river is given in Fig. 1. The main building is the machine shop and is 332 x 100 feet. The foundry is 168 x 100 feet with a 77 x 50-foot structure adjoining containing cleaning and pickling room on the ground floor and pattern department on second story. The floor of the pattern shop is supported on concrete arches and the pattern-making plant is of the latest type in every particular. The pattern storage building is located across the road from the foundry. The upper portion only is used for the storage of patterns and the lower floor is in use for sheet iron work. The forge shop is 40 x 40 feet. The power plant is in a separate building divided by a fire wall into engine and boiler rooms, the one being 56½ x 41 feet and the latter is 46 x 41 feet.

A view of the core department of the foundry is shown in Fig. 2, and Fig. 3 is the blower room. A 45-h. p. Crocker-Wheeler motor drives one of the two Buffalo Forge Co. blowers and the other is driven by a 20-h. p. motor of the same make. The former blower at 1,200 revolutions per minute supplies blast to a 12-ton cupola built by the Northern Engineering Works and the other at 1,500 revolutions per minute supplies a 5-ton cupola of the Whiting Foundry & Equipment Co.'s manufacture. These cupolas are seen in the foundry, illustrated in Fig. 4, and are 53 inches and 40 inches diameter inside the linings.

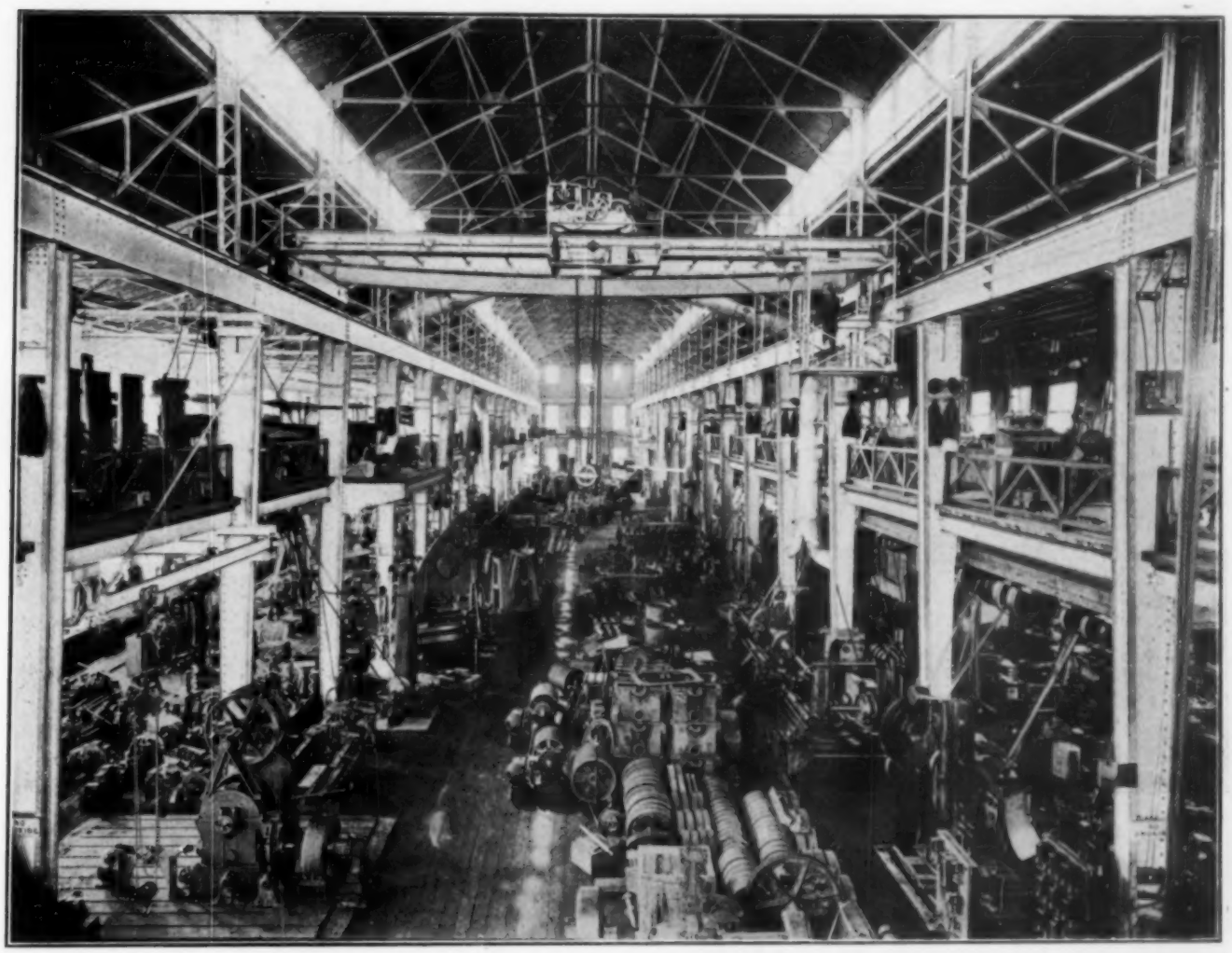


FIG. 7.—MACHINE SHOP.

The foundry has two 20-ton Shaw electric cranes, each with a 5-ton auxiliary hoist, located in the main bay. There are two 2-ton traveling pneumatic hoists in the lean-to and an air hoist at the core ovens. Fig. 5 shows the permanent beds for making core irons and loam tools. Fig. 6 is the facing sand department.

The sand, coke and iron are piled in sheds or in the open and the charges are made up in the yard. The loaded cars are then lifted to the charging platform by means of an elevator. The plant is equipped with a chemical laboratory and analyses are made of all materials coming to the foundry as well as the outgoing product.

The machine shop in Fig. 7 is seen from the gallery on second floor near the elevator testing department. The shop has a central bay commanded by a 15-ton Shaw electric crane, with Crocker-Wheeler motors. Many of the machines have individual electric drives though there is one line shaft on the north side operated by a 60-h. p. motor through a

belted connection. The main floor on the opposite side has a 15-h. p. motor. The individual drives are of various sized motors and include one 20-h. p. Crocker-Wheeler attached to a Gray planer.

The power equipment, electrical and otherwise, is of an interesting character. The two boilers are each 150 h. p., water tube type, and were built by the Aultman & Taylor Co. The products of combustion pass to a 6-foot stack, 150 feet high. The engine room has a 10 x 18 x 30-inch Hewes & Phillips 175-h. p. tandem compound engine direct connected to two 50-k. w. Crocker-Wheeler direct current generators. These supply current at 115 volts and are in series with a three-wire distributing system. The current is at a pressure of 115 volts between adjacent wires and 230 volts between the outside wires. The variable speed motors use the former voltage for medium and the higher pressure for high velocities, with resistance in the armature circuits for slow and intermediate speeds. The 230 voltage is also employed for lighting and constant speed motors. There is a 1½-k. w. rotary transformer for converting the 230-volt direct current into 130-volt alternating. This is delivered to a transformer for raising the voltage from 1,000 up to 3,000 in testing insulation resistance. This apparatus is located in one of the galleries adjacent to the department engaged in assembling elevator controllers.

ing tables were also designed by the company and are considered original. The seats or benches are of good length and like the table supports have foot rests. The general design of the tables will be understood from the halftone.

Fig. 9 is a portion of the erecting room exclusively employed for the Secor oil engine. This department is placed in one of the galleries and here are assembled the very noteworthy kerosene engines built for the General Power Co. Ice machines are also manufactured for the Buffalo Refrigerating Machine Co. Fig. 10 illustrates an important branch of the business in one detail; this is the testing department of electric elevators. The equipment for this purpose is a pair of steel framed shafts for 5-foot cars. These are counterweighted and the cables permit of testing to 10,000 pounds. The shafts have a 12-foot square floor plate with tee slots. The hoists are bolted on these for testing and are examined for speed, power and freedom from overheating during continuous running. This class of machinery is equipped with Crocker-Wheeler motors.

Material for Protecting Iron Work.

William O. Emery, of Crawfordsville, Ind., has obtained a patent on a material and the method of its preparation for use in protecting iron and metal work, cables, etc. It consists of asphalt as a matrix carrying a resisting composition of silicates of calcium and sodium with an aluminate of calcium. The method of preparing the substance consists in fusing at white heat quicklime, quartz, feldspar, and alumina in such quantities as will yield, in the presence of carbon, a clear, highly-viscous mass, crushing the resulting flux to powder, and adding this to melted asphalt, the temperature of the latter being raised while the powder is added.

FIG. 8.—DRAFTING ROOM.

The engine room has a Deane circulating pump, 10 x 14 x 10 inches, operating as a jet condenser, a McKeernan Drill Co.'s air compressor with cross compound steam cylinders 10 x 18 x 10 inches, and two-stage compression air cylinders of same size. The air compressor is automatically controlled and delivers air into a receiver of 50 inches diameter and 10 feet high. A Harrisburg 10 x 10-inch horizontal engine of 40 h. p. is belted to two 30-k. w. generators of the Bullock manufacture and on occasion is employed for lighting purposes.

A seven-section stack of 1-inch pipe in the machine shop contains 6,865 feet of piping for heating the air supplied to an 84-inch Buffalo Forge Co.'s blower. The heated air is distributed by overhead galvanized iron conduits in the usual manner. A high pressure blower made by the American Gas Furnace Co. is located near by and supplies the three forges of the blacksmith shop as well as the annealing and tempering furnace and blowpipes for brazing.

The drafting room, Fig. 8, has at least two points of interest. One is the system of lighting which comprises a series of 32-candlepower lights arranged around the walls near the ceiling. This gives ample light and does not produce the troublesome shadows frequently found in drafting departments of an otherwise irreproachable description. The draft-

The Midland Metal Works, Hubbard & Co., Philadelphia, will be incorporated, Jan. 1, under the laws of Pennsylvania, becoming Midland Metal Co., Inc. The character of the business will be substantially the same as heretofore, covering a general and full line of brass, bronze and copper goods, finishing and plating, with the addition of a fully equipped ornamental and architectural iron working department. As soon as completed the company will occupy its new factory premises, 1427-1433 Catharine street (Broad and Catharine streets), where it will have greatly increased space and facilities to handle the work now under contract. The officers are: Wm H. Hubbard, president; John W. Flanagan, secretary; C. P. M. Rumford, treasurer.

The Pittsburg Iron Market in 1903.

During the twelvemonth period just ended, history in the iron and steel trade has again repeated itself. High prices have been followed by lower values, while record iron and steel production, with heavy foreign importations to meet requirements, has been followed by a tremendous falling off in consumption, and instead of continuing heavy importations of steel and iron products we are now seeking an outlet abroad for our surplus production. While this tremendous change has taken place in less than one year, the trade was several years in reaching the turning point; but it is not expected that recovery will be extended over a like period. Unlike the fall of prices in 1900, when prices in several lines sought new low levels, the depression felt so keenly in the past six months is one of consumption and tonnage has fallen off tremendously though prices have not sought the low levels of three years ago. In 1900 on the other hand consumption was heavy and production fell off but little, values suffering most from the reaction.

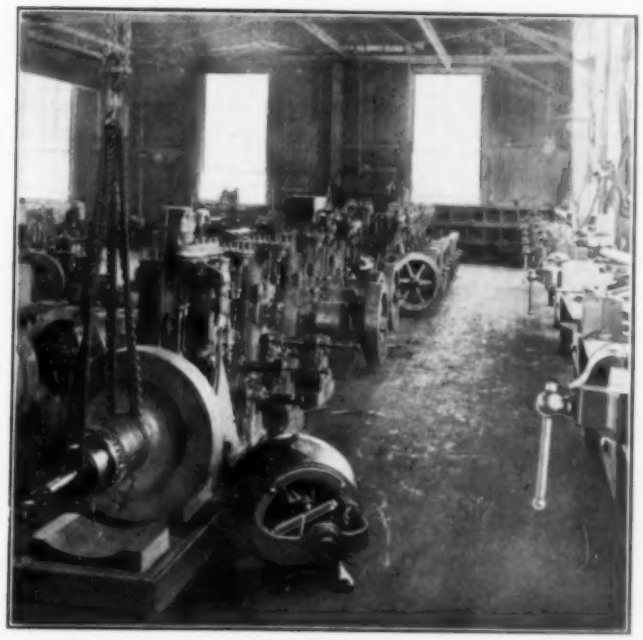


FIG. 9.—SECOR ENGINE ERECTING DEPARTMENT.

That the market would ease off to some extent during 1903 was believed by all who had watched the trend of affairs, as the increased capacity in all iron and steel lines was much greater than any normal increase in consumption and increased competition was bound to result in a reduction of prices. That consumption would fall off to the extent it has was wholly unlooked for, and the tremendous curtailment in pig iron production during November is unparalleled in the history of the iron trade of this country.

The tonnage on the books of the rail, plate and structural mills a year ago augured well for a successful year. With the business carried over the rail mills had about 2,200,000 tons closed early in the year while in plates and shapes there was close to a million and a quarter tons. Despite a slight reaction during May and June, the production of the first six months in all lines exceeded all expectations and the slight depression that was beginning to be felt was believed to be only a temporary lull in the trade. Strikes in nearly all lines, which had been numerous during the spring, began to increase and building throughout the country was practically at a standstill. This resulted in the cancellation of many orders for shapes, plates suffering to some extent, and with a tight money market following, the railroads commenced to cancel orders for rails and steel cars. Specifications in other lines were held up with the result that consumption fell off to an alarming extent and furnaces and steel works were compelled to shut down. All lines of iron and steel products have suffered, and while the falling off in demand affected some sooner than others, all lines felt the depression before the close of the year. Pig iron declined $8 to $9 and billets and sheet and tin bars, $7 to $8. Steel bars which had been maintained on a uniform basis for several years were reduced $6 but on the other hand plates, rails and structural shapes did not decline, the manufacturers' associations in these respective lines believing that reductions would not aid the general situation.

The tonnage on the books of the mills for delivery in 1904 is by no means prodigious, and with the possible exception of rails of which about three-quarters of a million tons have been booked, the mills could easily take care of all business in hand for immediate deliveries. The only important new capacity in the Central West that will come in during the year is the plant of the National Tube Co. at Lorain, O., a plate mill at the Homestead plant of the Carnegie Steel Co., and the open-hearth department of the Lackawanna Steel Co. at Buffalo. A number of blast furnaces are also under erection, on which work is not being hurried owing to the general conditions of the iron market.

The era of new construction among independent steel producers practically came to an end with the beginning of 1903, and early in that year the United States Steel Corporation announced improvements and additions to cost close to $36,000,000. Outside of the tube line these improvements are not going forward very fast at the present time, and the indications are that they will not be hurried until conditions show signs of improvement. The steel-producing capacity of the district was increased by the lighting of ten 50-ton open-hearth furnaces by the LaBelle Iron Works at Steubenville, O., five of the same capacity by the Sharon Steel Hoop Co., while the Republic Iron & Steel Co. doubled its Bessemer capacity at Youngstown, O. The Clairton Steel Co., LaBelle Iron Works, and Carnegie Steel Co. each blew in one furnace, while the

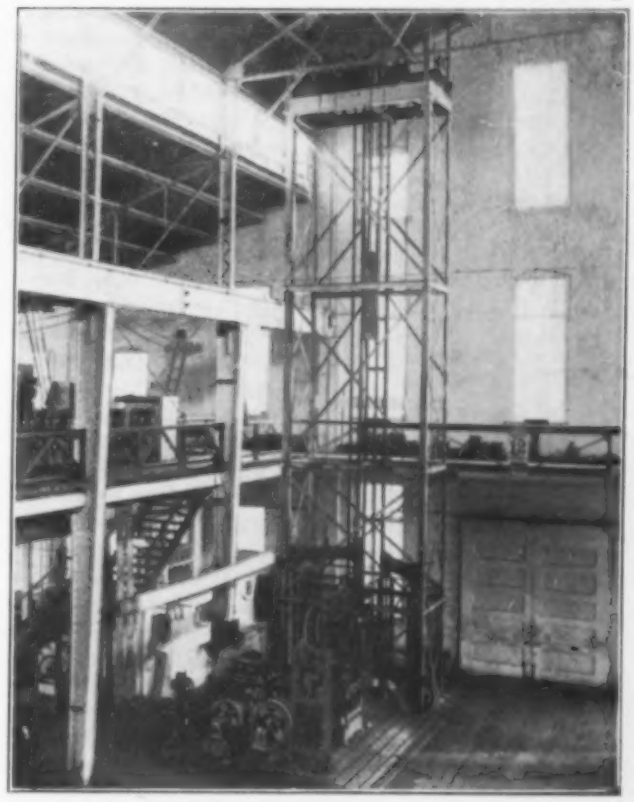


FIG. 10.—ELEVATOR TESTING DEPARTMENT.

Adrian stack at Falls Creek, Pa., aided in swelling the list of new furnaces producing foundry iron. Two new furnaces under erection at the Sharon plant of the Carnegie Steel Co., and at Donora, Pa., which were to have been blown in early in the year, are still under erection, and work on them is not progressing very fast. At present the Wheeling Steel & Iron Co. has a stack under erection at Wheeling, W. Va., LeBelle has one at Steubenville, while the Jones & Laughlin

Steel Co. is adding a fifth stack to its Eliza plant and another stack at the Ohio works of the Carnegie Steel Co., Youngstown, O., is nearing completion. At New Castle, Pa., all the furnaces of the Carnegie Steel Co. are being rebuilt, while the National Tube Co. has two stacks under way at Lorain, O., and one is contemplated at McKeesport. There is practically no new construction under way in other lines, by manufacturers in this district except the pipe plant of the National Tube Co. under erection at Lorain, O., which will have an output of 300,000 tons annually.

Competition between the independent manufacturers and the American Sheet Steel and National Tube companies became exceedingly keen during the year. In both lines the independents formed associations to further their interests. The sheet manufacturers succeeded in getting wage concessions from the Amalgamated Association, while the pipe manufacturers succeeded in preventing ruinous price cutting. With its increased capacity, the National Tube Co. will be in position to take care of nearly all the domestic requirements in its various lines and competition promises to be unusually keen.

Wages of all connected with the manufacture of iron and steel products which had been on a high level for several years, were readjusted at the close of the year, reductions being made by all manufacturers. In nearly all lines advances were granted last summer, the Amalgamated Association securing an advance in its bar iron scale, while on tin plate the limit of output was increased. Following reductions in the non-union sheet mills of the American Sheet Steel Co., the Amalgamated Association extended the limit of output and also reduced wages 10 percent. Coke workers' wages were reduced in December about 17 percent, the first reduction in ten years.

Pig Iron.

Pig iron prices declined $8 to $9 per ton on all grades during the year, all the furnaces in this and the Valley districts operating at their utmost capacity during the first five months, while during the last four every effort was made to restrict output. In April there was a pronounced falling off in the demand for foundry grades, the foundries having little work ahead of them, and the demand for other grades began to ebb during June and July. No. 2 was at its high point in March and melters desiring iron concluded to hold off until better prices would be named. The falling off in consumption in the last half of the year was tremendous.

In January the high point on Bessemer was reached, $23, Pittsburg, having been paid on small lots for prompt delivery. The steel works demand was heavy; all the merchant furnaces had orders on their books that carried them well through the first half. Considerable trouble was experienced during the months of January and February in securing a sufficient supply of coke, and not only merchant furnaces, but those of the steel corporation were compelled to bank for short periods. The merchant furnaces in the Valleys having contracts for delivering Bessemer to the subsidiary companies of the steel corporation through the first quarter on a coke conversion arrangement were unable to secure a sufficient supply from the H. C. Frick Coke Co., and were compelled to go into the open market, paying from $7 to $8 per ton. Iron made from this high priced coke was consequently not delivered to the steel corporation companies and the last deliveries on this iron were not made until June instead of April. In January contracts for delivery through the first half were closed at $21.85, while in February $20.50 was quoted for second half delivery. In April the steel corporation opened negotiations for iron for delivery during the third quarter, but did not close until May, when an order for 110,000 tons was placed at $19.35, Pittsburg, while a small lot for June and July delivery was purchased at $19.85. In July and August the steel works began to feel the falling off in demand, and the plants that were closed down for repairs in July continued closed in August on account of a lack of orders. The big falling off in the demand for steel making iron resulted in heavy declines of both Bessemer and basic during the months of August and September, and early in the latter month furnaces began to bank owing to the falling off in specifications and the lack of new business. In September Bessemer declined to $16.85, Pittsburg, and the further falling off in the demand for steel products was followed by the closing down of additional steel plants and the situation became so acute during this month that it was decided to restrict production. A general call was issued by J. G. Butler Jr., of Youngstown, O., for a meeting of all the blast furnace operators in the Central West which was largely attended. A committee was appointed to decide upon a plan of limiting production. It was decided to curtail output 25 percent during the last quarter of the year, with the result that production was not only restricted to this extent, but before the end of the month had been cut off fully 40 percent. This was followed by a still further curtailment during November, while December's production even fell below that of November. Furnaces in the East also curtailed their output, but the plan talked of by the Southern operators was not carried out. Further declines in prices followed and Bessemer iron was selling at $13.50, Valley furnace, at the close of the year. Basic iron, which followed Bessemer closely throughout the year, was quoted at from 50 to 75 cents lower than Bessemer during the last two months. The purchase of the steel corporation made in May was the last for the year, and the indications are that the new year will be well advanced before another purchase needs to be made from the merchant furnaces, to make up the deficiency in output of the corporation's blast furnace plants.

Southern furnace operators were the first to feel the falling off in the demand for foundry iron, and in March the Southern association announced a reduction of $1 for second half delivery, establishing No. 2 on the basis of $17.50, Birmingham, and also putting into effect a differential of $1 per ton in favor of Eastern buyers. Outside furnaces immediately cut these agreed quotations and in June No. 2 was reduced to $15 Birmingham and forge was fixed at $13.75. At the same time the differential in favor of the East was abolished. Outside producers continued to make still further concessions, and the quotations of Northern furnaces in this district were below those of the Southern producers. A still further reduction of $1.50 per ton was made by this association in July, which still was fully $1 per ton above the average selling price, and in August No. 2 was reduced to $12 Birmingham and forge to $10.75. This action had the effect of not only demoralizing the Southern market on foundry and forge, but the Northern market as well, and in October the expected dissolution of the association occurred. In the meantime Northern furnaces reduced prices very materially and little Southern iron was being sold in this market. In October the Southern roads granted a reduction of 50 cents a ton in freight rates, making the tariff from Birmingham to Pittsburg $4.35. The low points on Southern grades were reached in November when No. 2 sold below $9 and a small lot of forge for Pittsburg delivery was sold on the basis of $7.65, Birmingham. The Northern furnaces absolutely refused to meet these quotations, and what little business was placed in this district during this month went to Southern producers. Toward the close of the year the Southern market stiffened from 75 cents to $1 per ton, while forge which sold as low as $12.75, Pittsburg, went to $13.25, and for first quarter delivery slightly better prices were secured. With lower labor costs, cheaper coke, limestone and possibly ore, the Northern operators will be in position to make slightly better prices during the new year before costs are reached, and with so many idle stacks competing for tonnage there is little likelihood of an advance in the near future.

Billets and Rods.

The scarcity of billets, sheet and tin bars, and rods which prevailed throughout 1902, continued well into 1903, Bessemer billets during the first five months selling above $30, Pittsburg. Finishing mills not controlling their own steel supply were unable to purchase steel at these prices and compete on bars, plates and structural material, and but for the heavy importations of sheet and tin bars made by the independent tin plate and sheet manufacturers, they would have been unable to make a profit on their product, meeting the quotations of the two largest producers in these respective lines. In addition both Bessemer and open-hearth steel was very scarce, the subsidiary companies of the United States Steel Corporation having been forced into the open market in order to secure a sufficient supply. While the purchases of foreign steel were

not as heavy early in the year as during the closing months of 1902, considerable was purchased, one local concern securing 10,000 tons at a cost close at $32, delivered, Pittsburg. With the falling off in the demand for finished products, the heavier forms of steel became more plentiful and prices began to recede in June. Concessions were made on both Bessemer and open-hearth, and early in July very low prices were reported.

A meeting of the leading steel manufacturers was held about the middle of this month for the purpose of establishing prices, and the new quotations placed Bessemer billets on the basis of $27, Pittsburg, with open-hearth taking $1 advance. Sheet and tin bars were also reduced proportionately, while rods not controlled by any agreement sold down to $33 from $36 for Bessemer. This reduction put an end to all further importations, as the German mills were not inclined to meet this price. This was the first meeting of steel producers to control prices, held since November, 1900, at that time Bessemer billets having been fixed at $19.75, Pittsburg. For two years and eight months there was no need of artificial means to control the situation.

The announcement of these prices of course was not followed by heavy buying, and the small orders that were being placed were taken by independent producers who were making concessions of from $2 to $3 per ton. Another meeting of the leading steel interests was held in September, when prices were reaffirmed, but conditions became so acute that a general meeting of steel manufacturers was held the first week in November and was attended by representatives of twenty-four concerns. A straight reduction of $4 per ton was made on Bessemer billets and $5 on open-hearth, placing the latter on the same basis as Bessemer. These quotations were adhered to the remainder of the year, a meeting of the manufacturers having been held in December at which prices were reaffirmed and the organization continued. The number of steel works idle the last four months of the year was prodigious and the proportionate capacity idle was greater than at any time in the past ten years. Bessemer and open-hearth rods also declined proportionately, being quoted at $30.50 and $31 the last month of the year.

The steel producing capacity of the district was further increased by the lighting of ten 50-open-hearth furnaces by the LaBelle Iron Works, Steubenville, O., while the Sharon Steel Hoop Co. placed five open-hearth furnaces in operation. The Republic Iron & Steel Co. also doubled its capacity at its Bessemer plant, Youngstown, O., these improvements having been completed when there was practically no demand for the heavier forms of steel products.

Structural Material.

Uniform prices prevailed throughout the year on the heavier sections of structural material, premiums having been paid only during the first four months on light angles, and the tonnage placed at these advanced prices was not large. The year opened with every prospect of being a record breaker, but strikes of structural steel workers and others in the building trades practically put a stoppage to all new construction early in the year. The employes of the American Bridge Co. in this district went on a strike for higher wages in the spring and operations were not resumed until well in the summer. New projects were consequently held up and specifications could not be secured by the mills on the large tonnage on their books. The structural mills had contracts for about 600,000 tons the first of the year, and a large number of contracts were placed during February and March. No less than seven bridges were under erection in the Pittsburg district, requiring upwards of 60,000 tons of material, and owing to the strikes of the structural workers only a few of them have been completed. Early in the year deliveries on all kinds of material could not be secured in less than four months, but the holding up of specifications held back such a large tonnage that the mills were in position to make fairly prompt deliveries in May and June. During the later months of the year, only a few of the mills continued in operation, and those only on half time.

There has been no increase in the structural steel producing capacity in this district during the year, and the course of the steel trade at present does not warrant the erection of new plants. With the beginning of the new year the American Bridge Co. centralized its plant at Ambridge, seventeen miles from Pittsburg, where the largest structural fitting shop in the world has been erected.

Plates.

Contracts for 700,000 tons of plates were on the books of the plate manufacturers in January last year, and during the months of April and May producers in this district advanced prices for prompt deliveries $3 per ton, while Eastern mills were securing premiums of $8. In June the premiums were reduced by the Eastern mills to $6, while the Western mills closed orders for prompt delivery at the agreed quotation of 1.60c. The depression in stocks and the tightening of the money market resulted in the cancellation of many orders for steel cars, and the two large concerns with plants in this district operated only half time in July. A still further cancellation of car orders during August and September resulted in the shutting down of the car plants entirely, and the plate trade, so dependent upon this industry in the past three or four years, suffered greatly. Only a few of the plate mills in this district continued in operation during the latter months of the year, and as the railroads are not placing orders heavily for cars, there is little indication of a revival early in the new year. In addition the shipbuilding trade is not very prosperous, only a few vessels being under contract for delivery in 1904. A tremendous tonnage of plates is also used by the structural fitters and the demand also suffered from this source owing to the falling off in new construction. At present the Carnegie Steel Co. has one large plate mill under erection at Homestead, Pa., and this is the only increase that will be made in the present capacity in this district the coming year. While a few mills shaded the agreed price of $32 during November and December, the plate association at its last meeting decided to make no change in ruling quotations.

Bars.

Early in the year heavy consumers of steel bars insisted on concessions of $2 per ton on long time contracts, but the steel bar association almost throughout the entire year refused to grant any concessions, with the result that there was no heavy contracting for bars at any time during the entire year. Owing to the large steel bar producing capacity of the country, consumers during the first half of the year, when demand was greatest, experienced no difficulty in securing prompt deliveries, while during the second half of the year the large continuous mills operated by the Carnegie Steel Co. and Jones & Laughlin Steel Co. were idle the greater portion of the time. During the summer months the steel bar manufacturers agreed to guarantee quotations against a decline, but even this move did not stimulate buying. Following reductions made in billets, steel bars were reduced $6 per ton in November, placing them on the basis of $26, Pittsburg, as compared with $32 which had prevailed for more than a year. Heavy buying did not follow the reduction owing to the limited demands of the consumers, and further concessions must no doubt be made before contracts for requirements for the first half are closed.

Iron bars on the other hand sold above steel bars throughout the entire first half of the year, in April and May a considerable tonnage having been placed on the basis of 1.85c, Youngstown. The high point was reached during these months, and prices fell off during June and July in keeping with other products. During September, October and November the decline was rapid. With the establishment of new prices on steel bars, iron bars were fixed on the same basis, but have since declined $1 per ton on desirable tonnages. The operation of the Deering steel plant which will provide many of the plants of the International Harvester Co. with bars, has taken a large tonnage away from the large manufacturers of steel bars, which at the present time is being felt keenly. The steel bar producing capacity has not been materially increased during the year, but the increase in iron bar mills has been heavy and the already large producing capacity has been increased way out of proportion with the consumptive capacity of the country.

Wrought Pipe and Tubes.

Unusual prosperity characterized the pipe trade throughout the past year, despite the falling off in the demand for other iron and steel commodities. Not only the National Tube Co. but the independents as well operated their plants at their

utmost capacity during the first nine months, while during the last quarter the greatest falling off in demand was in the merchant sizes. Early in the year orders were placed with both the National Tube Co. and independents for nearly 200,000 tons of line pipe, for extending natural gas mains from the West Virginia field into Pittsburg and for increased oil country demands. This tonnage carried the mills of the National Tube Co. operating on the larger sizes almost through the entire year and the few independents that produced the larger pipe also operated in full the greater part of the year. Prices were uniformly maintained until the last quarter, when the independents began to make concessions and the year closed with iron pipe quoted on the same basis as steel. During the last half of December boiler tubes declined 10 percent and discounts on other grades of pipe are being readjusted to conform with the lower prices of steel billets and forge iron. The competition of the independent pipe interests had much to do with the announcen ent of the erection of a new pipe plant at Lorain, O., by the National Tube Co., which will be the largest individual pipe mill in the world while the extensions and improvements at McKeesport will make that plant the most important factor in this entire district. Of course producing capacity is to be greatly increased and with the completion of these plants, and with the anticipated lessening of costs, the independent pipe manufacturers will find the competition of the largest producer keener than ever before. During the year the plant of the LaBelle Iron Works, Steubenville, O., was placed in operation as well as that of the Susquehanna Iron & Steel Co., Columbia, Pa. The plant of the Eastern Tube Co., Zanesville, O., on the other hand had financial difficulties. The future of the pipe trade is full of interest, as it is apparent that the National Tube Co. with its increased capacity must capture the bulk of the domestic trade, while the foreign trade will be greatly increased.

Prices of iron and steel skelp declined about $12 per ton during the year. During the first three months of the year as high as 2.15c f. o. b. mill was paid for narrow sheared iron skelp, while grooved was quoted on the same scale. Skelp producing capacity was increased by the completion of several mills by the LaBelle Iron Works, Steubenville, O., and the Youngstown Iron Sheet & Tube Co. also added to the skelp capacity. Muck bar suffered a decline of $10 from the year's high point to the closing quotations. Considerable muck bar produced in Eastern Pennsylvania mills found its way into this district during the first quarter, but owing to the falling off in demand little was sold the remainder of the year.

Rails.

With 400,000 tons carried over, and orders for more than 1,800,000 tons for delivery during the year there was every indication of a record breaking rail output. The spring deliveries of standard sections were unusually heavy, while small orders for November and December delivery were numerous at this time. A tight money market caused the cancellation of many orders, resulting in the shutting down of the Ohio rail mill at Youngstown for almost three months, while the output at the Edgar Thomson plant during the past two months was greatly curtailed. In June prices for 1904 were announced on the prevailing $28 basis for standard sections and immediately following this announcement orders for fully a half million tons for 1904 delivery were placed. The contracts placed for 1904 during the last half of the year do not call for more than a quarter million tons, and with the opening of 1904 the rail mills of the country are carrying orders for about 750,000 tons as compared with about 2,200,000 tons one year ago. During the year the rail mills of the Lackawanna Steel Co. and the Tennessee Coal, Iron & Railroad Co. were placed in operation. The output of both plants for this year was limited, and it is not expected that the latter mill will be a serious competitor of the Bessemer rail mills.

Light rails which sold at prices ranging from $38 to $40 for 16 to 40 pound sections early in the year dropped to $25 and $26 per ton respectively with the close of the year. Several independent light rail mills have been placed in operation during the year while two are now under erection. The anomaly is presented at the close of the year of standard section rails being held higher than light sections despite the great difference in the cost of rolling. Efforts to limit production and maintain prices are being made, and a meeting with this in view will be held shortly.

Nails and Wire Products.

Demand for wire nails and wire products was uniformly heavy throughout the entire year. On January 1 an advance of $1 per ton on all wire products was announced, followed by an advance of $2 per ton in February. Prices were well maintained until October, when slight concessions were made, and the year closes with prices about on the same level as at the close of 1902. Both iron and steel cut nails were sold at an advance over wire nails almost throughout the entire year. In December, however, heavy reductions were made in both with the result of placing them practically on the same basis as wire.

Sheets and Tin Plate.

Despite the great increase in the number of sheet mills during 1902, there was sufficient business to go around during the first four months and a number of the independents secured premiums of $3 and $4 a ton for prompt deliveries. The American Sheet Steel Co. on the other hand was adhering firmly to its established price of 2.75c for No. 28 gauge black sheets, and, there was no cutting on galvanized. With the falling off in demand during the summer months prices began to decline and following the announcement of a reduction of $8 per ton on black sheets, the American Sheet Steel Co. in November reduced the wages of all its tonnage men 20 percent, while the wages of the day hands were reduced between 10 and 15 percent. The competition of the non-union mills of the American Sheet Steel Co. which had been keen up to this time, was now of such a nature that the independent manufacturer could not pay the Amalgamated scale and operate at a profit. A second demand was made to have the limit of output in sheet mills removed and a reduction of wages was asked for. The Association agreed to increase the output 11 percent but only granted a 10 percent reduction in wages, the readjusted scale going into effect the first of the year. With the sheet producing capacity of the country twice the consumptive capacity, competition in the future promises to be as keen as in the past, and the erection of new mills has been stopped for some time to come. Galvanized sheets suffered a decline in proportion to that on black sheets, and with lower prices on spelter the mills will still be able to operate profitably at present prices.

The demand for tin plate throughout the entire year was uniformly good, and the country's output will break all previous records. Nearly all of the American Tin Plate Co. operated in full the first nine months of the year, the demands of the canning industry being unusually heavy. In October there was a slight falling off in demand and a number of the large plants were shut down, but the year closed with the majority in operation, considerable work being done on plate for the rebate trade. The year opened with 100-pound coke plates at $3.60 f. o. b. mill. Owing to the substitution of coal for gas in the Indiana mills of the American Tin Plate Co. and other increased costs at these plants it was announced in February that quotations would be made in the future f. o. b. cars destination with full freight added from Pittsburg to the point of delivery. On March 2 an advance of twenty cents a box was announced, but on November 16 prices were reduced equal to this advance. The outlook for the trade is good, and the rebate trade has helped out the mills immensely during the dull months of the year.

Old Materials.

Not in many years has the old material market been as demoralized as during the past six months, and values depended almost entirely upon the necessity of the seller to realize on his material. Contrary to expectations the railroads were throwing large tonnages upon the market and the dealers stocked up their yards with all kinds of desirable material at prices that represented bottom. Heavy melting stock during the first four or five months of the year was held at $22 and was extremely scarce at this price. The Carnegie Steel Co. early in the year covered for its twelvemonth requirements at about $21. During the last quarter all of the steel mills that had been heavy purchasers of melting stock carried heavy stocks and in many instances disposed of them

at the ruling market prices. Several large tonnages changed hands at $11, representing a drop of exactly this amount from the high point of the year. Cast scrap, rails, borings, etc., suffered proportionate declines. There is no indication of an early advance owing to the heavy stocks carried throughout the country not only by dealers but foundries and steel works.

Coke.

From record breaking high prices to quotations not much above cost is the record of the coke trade for the year. The withdrawal of the H. C. Frick Coke Co. from the general market in 1902 had resulted in a scramble of consumers to place their requirements, and prices on all kinds of coke sought new levels. Small lots of good grades of foundry coke for early delivery brought as high as $12 at the ovens while contracts for the first half calling for 72-hour coke were closed at $5.50 to $6. Furnace coke was selling at $4.50 and $5 and consumers at these prices met with much difficulty in covering requirements. With the opening of spring, work on new ovens throughout the entire Connellsville region was resumed with vigor, with the result that several thousand ovens were fired for the first time in July and August when the decline in the iron and steel trades set in. With the shutting down of furnaces and the curtailment of foundry production, coke ovens were drawn and prices went off.

The announcement of the H. C. Frick Coke Co. that it would again dispose of one-third of its output in the open market still further weakened the situation and efforts to form a pool to control prices and curtail output were futile. The year closed with foundry coke selling from $2 to $2.25 for prompt shipment and furnace at $1.60 to $1.70. Production costs were slightly reduced by wage reductions and the railroads will be compelled to reduce their extremely high tariffs prevailing throughout the entire Connellsville region early in the new year. Through the months of November and December fully one-half the ovens in the entire region were idle while the output dropped off proportionately. The year's output will fall below that of 1902, the heavy production during the first quarter not being great enough to offset the slump during the last quarter.

A. O. Backert.

During the year just closed the American Shipbuilding Co., which operates plants for building steel ships at Cleveland, Lorain, Buffalo, Detroit, Bay City, South Chicago and West Superior, turned out 42 modern freight steamers. Ten of the vessels are of the Welland canal size, which is about 2,500 tons; the other 32 are large carriers and the average carrying capacity is about 6,000 tons. The average cost of the boats was about $240,000, and nearly 100,000 tons of material was used in their construction. The number of new orders for ships for 1904 is small, compared with the number for last year, but the company has considerable repair work on hand and all of the yards except the Bay City plant will be fairly busy during the winter.

On account of the closing of the Illinois Steel Co.'s mill at South Chicago, 500 employes of the Chicago, Lake Shore & Eastern railway, which is operated by the steel company, have been laid off and 130 more discharged. Among the men discharged were 30 of the oldest employes of the company, mostly engineers. As a result of the shutting down of the Illinois Steel Co.'s plants, many smaller concerns in South Chicago have been forced to run short handed. Among those which have had to lay off men are: The John Mohr Boiler Works 60 employes; the Hibben Boiler Works, 20; and the Keeman & Hill Boiler Works, 20.

The Visible Typewriters Co., with salesrooms at No. 243 Broadway, and factory at No. 338 Pearl street, New York City, has been placed in the hands of a receiver. The company is a New Jersey corporation with a capital stock of $1,500,000. The liabilities are $35,000 and it is believed that the debts will be paid in full. The receiver will continue the business.

Four hundred employes at the Penn Iron Works, Lancaster, Pa., have been laid off, owing to lack of orders.

TAP REMOVER AND TOOLMAKER'S VISE.

The device illustrated in Fig. 1 is adapted to engage and remove pieces of taps which have been broken off in a threaded hole. It consists of a cylindrical holder whose diameter is substantially equal to the diameter of the tapped hole and which is provided with a squared section at one end to receive a wrench. This holder has longitudinal grooves corresponding with the tap grooves and equipped with sliding bars for engaging the tap fragment. These bars are fixed at the upper ends in a sliding collar by which they are moved lengthwise of the cylindrical holder. A loose sleeve slides on the holder and when the tap remover is applied to a broken tap the sleeve

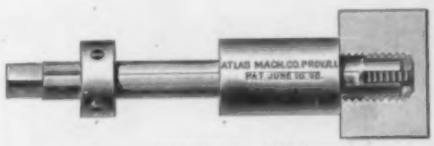


FIG. 1.—BROKEN TAP REMOVER.

is pushed down close to the work, supporting and holding the tap-engaging bars in their respective grooves at the point where the strain is applied.

The appliance is simple and strong and has the further merit of engaging the broken piece of tap with good chances of removing the obstacle without damage to the work. The device is now made in six sizes for standard taps from ¼ to ⅝ inch.

A toolmaker's vise is made by the same firm and is illustrated in Fig. 2. It is graduated in degrees for horizontal and vertical rotary movements and may be quickly transformed into a plain vise by removing the base, to which it is attached by two tap bolts. The movable base which revolves on ground cones has a vertical movement of 55 degrees, while the horizontal movement also on ground cones can travel the complete circle. The movable jaw is made light to afford the maximum range of opening. The screw operating the jaw does not rotate, the handle turning a long nut through which the screw works.

A plain swivel vise is made of a low type and is graduated for the rotary movement. The obvious feature of the vises is in the simplicity of the locking arrangement. The vise is se-

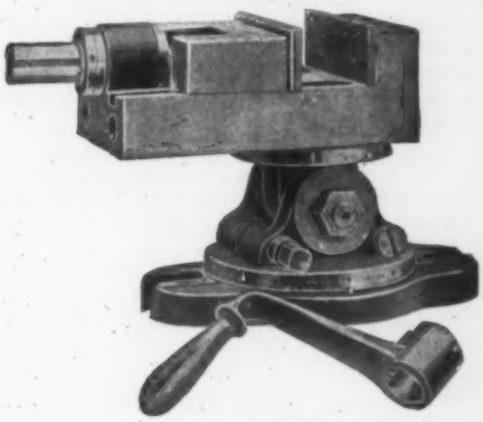


FIG. 2.—TOOLMAKER'S VISE.

cured on any part of the circle by a worm screw handled by a socket wrench. The checking device is quite compact and is said to be very effective.

The tap remover and the vises are manufactured by the Atlas Machine Co., of Providence, R. I.

The Pennsylvania Railroad officials say that the company is not contemplating the building of a steel plant at Altoona as reported in daily newspapers. The rumor probably arose from the fact that the company is building a large foundry and a plant for the manufacture of wheels at Altoona, and is considering the advisability of enlarging the foundry to make castings for the new tunnels under the North and East rivers provided is is found that the work cannot satisfactorily be done by contract.

PNEUMATIC MOLDING MACHINE.

A molding machine differing in some respects from any on the market is manufactured by Charles Herman & Son, of Allegheny, Pa.. The machine was invented by Charles Herman. While there are many methods in use on power molding machines for the purpose of settling sand about the pattern, this machine is the one on which a jarring method is utilized and

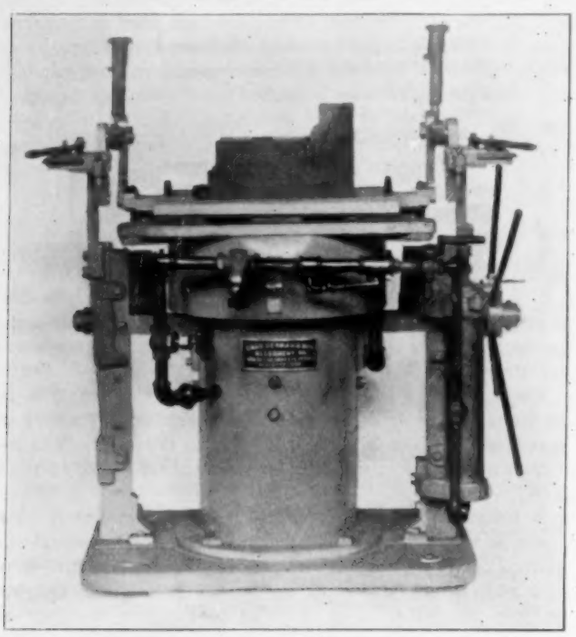


FIG. 1.—FRONT VIEW OF MOLDING MACHINE WITH MOLDING BOARD AND PATTERN IN PLACE.

may be operated either by compressed air or steam. Molds with patterns from 1 to 12 inches in height can be rammed in from 10 to 15 seconds without the aid of hand ramming. In the larger sizes the machine handles molds of a weight, including the patterns, up to 1,200 pounds.

Four views of the machine are shown in the illustrations. Fig. 1 is a front view of the machine, with molding board and pattern in place. Fig. 2 is a similar view to Fig. 1 but showing the pattern plate in a vertical position. Fig. 3 is an end or side view of the machine and Fig. 4 shows the jarring mechanism. The stripping plate is not seen in any of the illustrations.

The machine is supported on a base plate, upon which there is a jarring block. There is a cylindrical casing extending up from the base plate around the jarring block which is secured to the base plate by bolts. A cover with a flange to protect the enclosed mechanism fits over the upper end of the casing. The pattern plate has lugs or pins supporting the stripping plate and guiding the flask into place. The jarring mechanism is within the cylindrical casing and is separately shown in Fig. 4. This consists of a central post, secured at the upper end to a crosshead sliding on guides inside the cylindrical casing and carrying the plate supporting the mold together with the flanged casting which covers the cylindrical casing. When in the lowest position the lower end comes in contact with the jarring block in the center of the base plate. Fitting around the post or shaft is a stationary cylinder attached to the cylindrical casing extending up from the base plate. This cylinder has a valve chest containing a slide valve, which controls the admission and exhaust of the air or steam. A piston is permanently attached to the post and causes the post to ascend or descend as the air is admitted to the cylinder above or below the piston. The slide valve has a stem extending through a packing box on the upper end of the valve chest and has nuts at the upper end for the forked end of a rocking lever. This lever is pivoted to a standard screw on the upper cylinder head. The opposite end of the lever is also forked and fits around a rod coming down from the crosshead.

The piston and crosshead are raised by admitting air below the piston, the pattern plate, stripping plate and flask traveling with the piston and post. As the crosshead rises, the rod connected with the rocking lever throws the valve in such a way as to cause the air in the lower end of the cylinder to exhaust, while the working fluid at full pressure is admitted above the piston. This causes the post to descend rapidly and strike the jarring block. The machine is set to strike about 120 blows per minute. Sixteen to 20 blows are generally sufficient to compact the sand in an ordinary sized mold.

In operation, the stripping plate is placed over the pattern and the flask located. The latter is then filled with sand, the valve of the supply pipe admitting the air to the valve chest is opened and the series of operations will take place; that is, the air will raise the mold until the valve mechanism cuts off the supply, when the mold will descend rapidly until the central post strikes the jarring block. These operations will be automatically repeated until the supply of air is shut off. After the mold is rammed, lifted and turned over, the pattern is drawn out through the stripping plate, this part of the work being accomplished very much as in other types of molding machines.

Inasmuch as the parts of the jarring mechanism are confined within the casing, and the cover with its flange always encloses the upper part of the casing in all positions, the machine is rendered practically sand tight, thus protecting the working parts. Patterns usually machine molded flat can be molded upright on this machine. The sand is rammed hardest about the pattern and the mold is not so hard near the top, so that little or no venting is required.

The largest machines require a pressure of 60 pounds, while the smaller machines need proportionately less. The pattern shown in the illustrations is 10 inches long and 8 inches high.

Proceedings to restrain Nils Poulson, Charles Eger and Francis D. Jackson, as directors of the Hecla Iron Works, Brooklyn, N. Y., from dissolving the corporation were begun last week and the court granted an order for the directors to show cause why an injunction restraining the dissolution should not be granted. The plaintiff, E. J. Eils, contends that the corporation is prosperous and that he, as a bondholder and

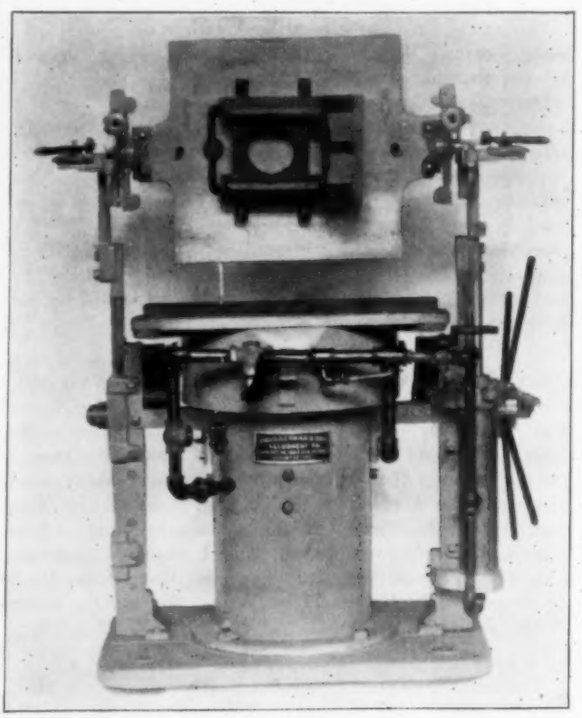


FIG. 2.—FRONT VIEW OF MACHINE WITH PATTERN PLATE IN VERTICAL POSITION.

stockholder, is entitled to a full thirty years' existence of the corporation as provided for in the corporation papers.

The plant of the United States Locomotive Works, Hammond, Ind., was sold at auction, Dec. 10, for $42,000, to Gostlin, Meyn & Co., of Hammond.

LAKE SUPERIOR IRON MINES.

There is no change in the mining situation on the Lake Superior ranges, with the near approach of the new year. It is not probable, either, that there will be any. In the matter of wages and employment alone will there be a difference. President T. F. Cole, of the Oliver Iron Mining Co., has been trying to keep miners' wages as well up as possible while the scuffle for retrenchment has been under way, and it is more than probable that is owing largely to him that the cuts generally anticipated are not greater than they are. Mr. Cole is not an alarmist, nor does he go off "half cocked," and he can see further than a good many people, as for instance the somewhat myoptic fraternity that views life from the Wall Street end.

While the by-product gas plant of the Zenith Furnace Co. will not be ready for some time, the city of Duluth benefits Jan. 1 by its contract with the company, and the rate for gas for all purposes in Duluth is 90 cents. The improvements under way by the company are taking longer than originally anticipated. As was stated in *The Iron Trade Review* some months ago, and then denied by local papers, the company will not begin making iron before spring.

Near the village of Kimberley, on the Northern Pacific road, 100 miles west from Duluth, and south of the tracks, three churn drills are at work looking for an iron ore formation. There are through that district occasional outcroppings of diorite and slate, which seems to have had an effect on the explorers. The general elevation is some 300 feet lower than the Mesabi range, and the district is about 50 miles south of the prolongation of the general strike of that range. One or two newspapers have dignified the district and the work under way there by calling the first an iron range and the second a large amount of prospecting, and have stated that the Steel Corporation was at work there. This latter is absolutely untrue, for the present at least. It is stated from Kimberley that the Steel Corporation has secured options on more than 4,000 acres of land along the "formation," but who but a wizard is able to tell where the formation is, as the whole country, except for a few slight outcroppings miles apart, is cov-

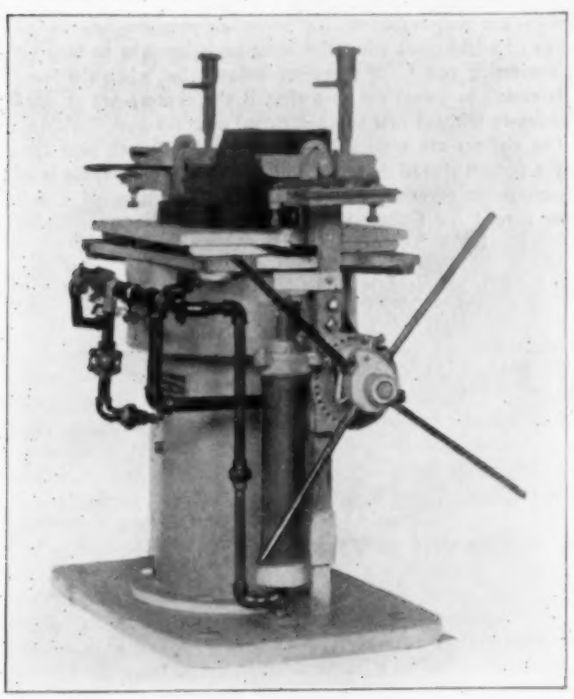


FIG. 3.—END VIEW OF MACHINE.

ered by from 25 feet to more of drift. The Orelands Co. has been working for nearly a year a little west of Kimberley and has cut ferruginous slates and run through some paintrock, together with some other encouraging indications. It has two drills at work. A St. Paul concern has the remaining drill in the region and what it has found cannot be learned. Others have sunk an occasional testpit or have examined a well here and there, but are now idle. The Orelands Co. thinks the formation something like that of the Gogebic, others have fantastic theories. Surely there is scarcely foundation in the above meager facts for sensational stories as to a large and important new range.

A very convenient vest pocket memorandum book comes from Arthur Koppel, manufacturer of narrow gauge railway materials, 66-68 Broad street, New York. Twenty-six pages are devoted to useful information on various subjects, and the balance of the pages are blank for memoranda. The cover is of celluloid with view of a standard steel side dump car, dumping to both sides, which is one of many styles of cars manufactured by this firm.

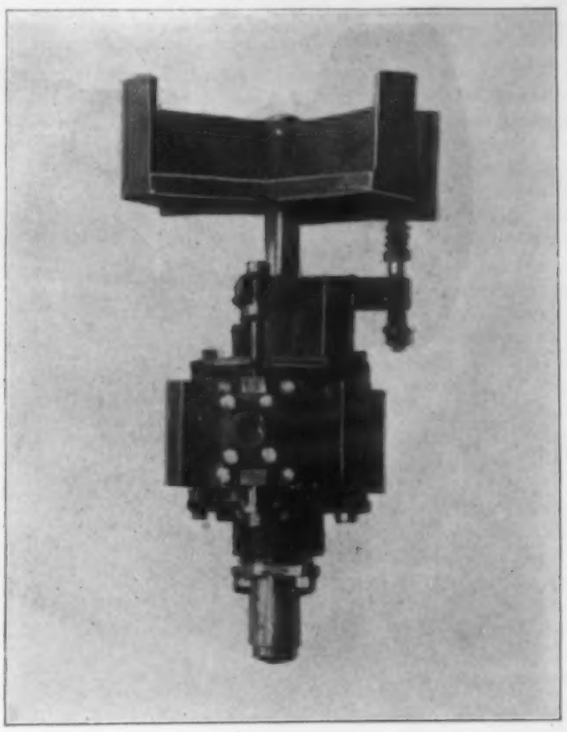


FIG. 4.—JARRING MECHANISM.

Consolidated Lake Superior Reorganization.

P. F. Rothermel Jr., one of the counsel for the Moffly committee of the Consolidated Lake Superior Co., was in Toronto Ont., last week in conference with Premier Ross, of the Ontario Government, and the members of his cabinet, in regard to obtaining assistance from the Government in the reorganization of the Consolidated Lake Superior Co. The Government was asked to advance the Moffly interests about $2,000,000, as a loan on the property of the Algoma Central & Hudson Bay Railway Co. A member of the Moffly committee states that if this advance can be obtained from the Government, it will be possible to pay off those in the Speyer syndicate who want their money, obtain possession of all the properties of the company, and proceed with the reorganization according to the committee's plans. An effort is being made by Mr. Clergue to interest Cleveland capitalists in the rehabilitation of the company.

Chicago eastbound roads have decided to reduce export rates on agricultural implements from Chicago to New York five cents a hundred pounds, making the rate 25 cents instead of 30 cents as heretofore.

The Canadian Government has appointed a commission to go to Europe to inspect the various plants that use the thermo-electric process for the smelting of iron ores and making of steel. The commission consists of Dr. Hannel, superintendent of mines, and Mr. C. E. Brown, assistant engineer of the Canadian General Electric Co., Peterborough.

WIELAND PIPE THREADING AND CUTTING MACHING.

It is interesting to note the appearance of a pipe threading and cutting machine which in general design resembles a modern machine tool. Fig. 1 shows that the bed or column has every point supported to the floor and that it is cast in one piece, including the spindle and shaft boxes. It is claimed that

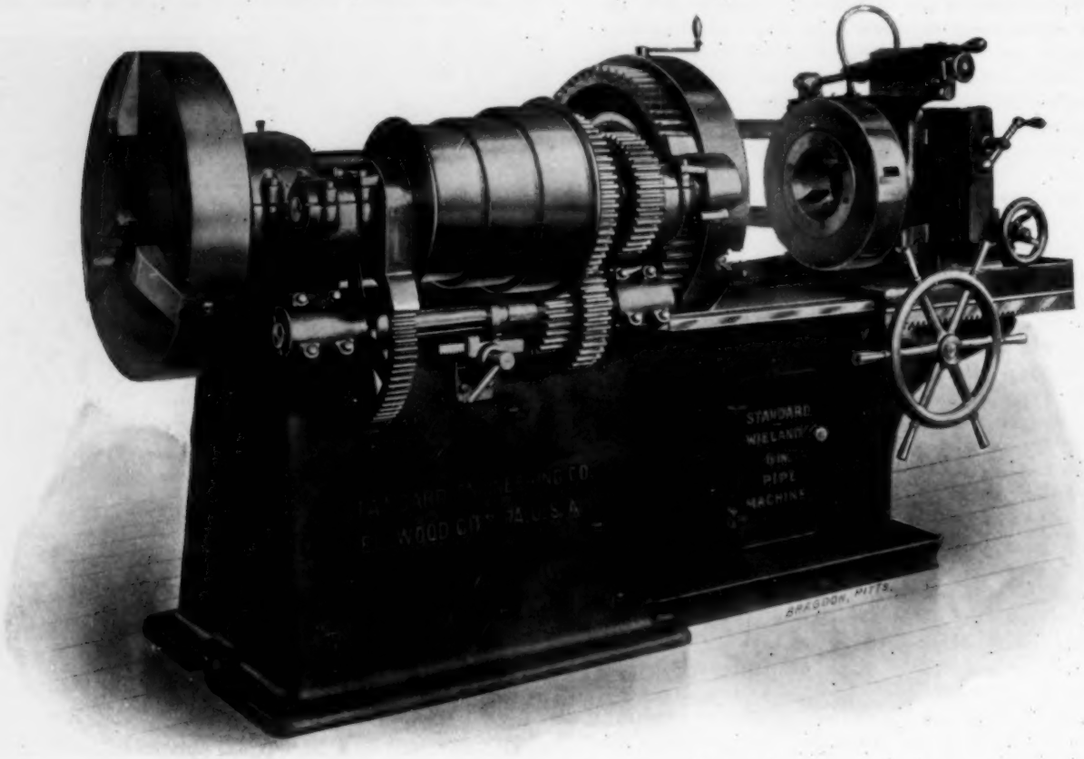


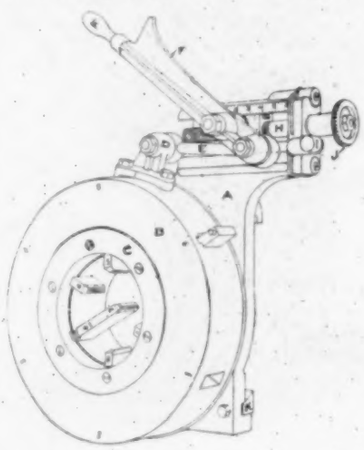
FIG. 1.—A NEW PIPE CUTTING AND THREADING MACHINE

a one-piece column is the type which will best stand up under the severe strains imposed on a machine of this nature. The machine is triple geared, the three-step cone pulley running loose and driving the lower shaft, which carries a compound gear by which two additional changes of speeds are obtained. All gears as well as the carriage racks and pinions, are machine cut, the pinion which drives the chuck gear being of steel.

The chuck is the standard lathe type as used on powerful engine lathes and has tool steel one-piece independent jaws. The two chucks are alike, the jaws on both projecting beyond the face of the shell. The projecting jaw feature on the rear chuck is for the purpose of holding flanges. The advantage of using the same style of jaw in the front chuck lies in the ability to handle short nipples, the operator being able to see where the pipe is being gripped without having to look into the bore of the chuck.

The die mechanism has some new features both in the manner of entering the interchangeable chasers in the die-head A and their adjustment and control when in use. As seen in Fig. 2 the lower chasers, 1, 2 and 3, are inserted from the bore of the die-head, the upper chasers, 4, 5 and 6, being put into place through openings in the periphery of the cam ring B. There is an opening in the periphery of the cam ring opposite each lower chaser also and through which the slots or ways in which they travel are cleaned without the necessity of removing the cam ring. The pins in chasers 4, 5 and 6 and slight projections in openings opposite chasers 1, 2 and 3 retain every chaser in place and obviate the danger of chasers falling out, a difficulty sometimes met in die-heads having interchangeable chasers. The function performed by a ring having a series of cams and rotating upon a hub is well known. The operating lever F which rotates the cam ring pivots on a fulcrum block G, and is shown in Fig. 1 in position when the die-head A is ready for threading pipe. In Fig. 2 the lever F is elevated to rotate the cam ring so that the chasers may be removed and replaced in the die-head. The fulcrum block is adjustable and is carried by a left hand screw H to which the gashed-rim hand wheel J is keyed. Moving the fulcrum block towards the left decreases the threading circle of the chasers, the circle being increased by carrying the fulcrum block towards the right. The cam ring operating mechanism is of toggle joint type. By reason of the arc-shaped fin F^1 under the lever F the toggle joint pin centers are maintained in an unbroken straight line at all points of adjustment when the lever fin is brought to bear on its projecting rest I. It therefore follows that when the lever F is raised to rotate the cam ring B the chasers are at once withdrawn without first being crowded onto the pipe.

The chasers are unusually deep, those for 6-inch pipe cutting a perfect thread or screw end 1¾ inches long. This is of advantage in several ways: it enables the cutting of a full taper thread for fittings tapped to extra depth; and, it also



WIELAND DIE MECHANISM
FIG. 2.

allows the entrance of casers to be ground and still leave depth enough for a standard length of thread. The makers claim to furnish chasers by which open hearth steel pipe may be threaded in one cut as readily as iron pipe.

The die-head A can be slid to one side when pipe is to be cut to length. In removing pipe from the machine the sliding

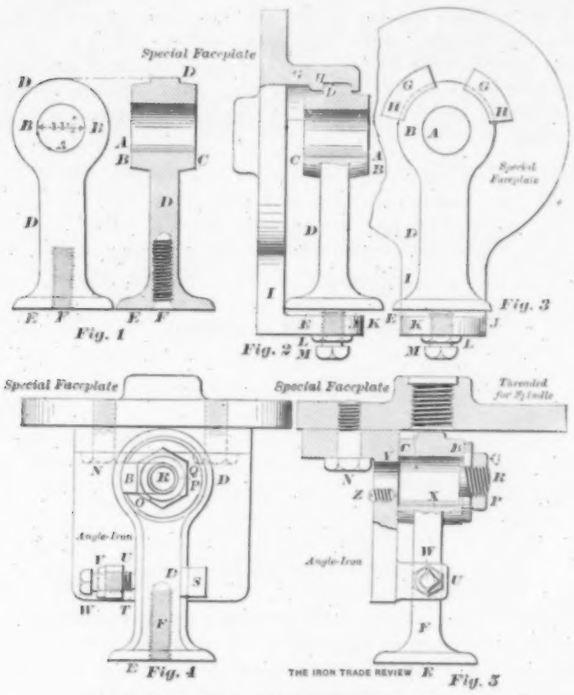
die head is of advantage as it prevents the ruin of the bottom chasers which in machines having a fixed die-head frequently results from the pipe being dragged across them.

The cutting-off slide has a lathe tool-post so that the burr may be bored out of pipe, without using a reamer—by angling the tool post. The slides for steadying the pipe when cut to length are universal and have removable steel jaws or facings. The countershaft has two friction pulleys which is also claimed a new departure in machines of this character. The machine is built by the Standard Engineering Co., of Ellwood City, Pa.

TWO LATHE FIXTURES.

BY JOSEPH V. WOODWORTH.

In Fig. 1 we have two views of a repetition casting. All the work required to finish these was accomplished in the lathe by means of two simple but labor-saving fixtures. The fixtures are shown in Figs. 2 to 5; Figs. 2 and 3 illustrating the fixture used for the first operation on the casting and Figs. 4 and 5 that used for the second operation. As the drawings are very clear and show the work in position on the fixtures no difficulty should be experienced in understanding their construction and use.



LATHE FIXTURES FOR REPETITION WORK.

As will be seen from Fig. 1, the casting is not unusual in shape, and does not require elaborate fixtures to allow of machining it rapidly and accurately. The work done on the casting consists of first boring the hole A and reaming it to a diameter of 1½ inches and then facing the sides B and A, as a first operation; then, as a second operation, facing the base E and boring and threading the hole F true and square with the hole A and the hubs.

The manner in which the first operation is accomplished can be understood from Figs. 2 and 3. Fig. 3 shows a plan of the fixture with the work located and fastened in position ready for machining; while Fig. 2 shows a sectional view, to illustrate more clearly the construction and manner of locating the work. The fixture consists of a special faceplate with two raised projections at G as locators for the work, and an extension at I for the fastening screw. The machining of this faceplate so as to allow of locating and fastening the work on it as shown requires no description. It will suffice to state that the insides of the lugs G were bored out and finished to conform to the radius and shape of the rib D of the circular portion of the casting. Fig. 1, and at a sufficient distance from the face of the faceplate to allow of clearance room for a hook tool for facing the side C, as shown in Fig. 2. A setscrew M with a cupped end at J, was let through K and equipped with a nut L for fastening the work up well into the locating grooves of the lugs G.

In use the fixture was screwed onto the lathe spindle and the screw M run out. Then the work was slipped into the locating grooves; the setscrew tightened and the nut L jammed; the casting thus located with the cored hole in the hub running approximately true. Now the face B was machined; then the hole A bored and reamed; and lastly the face B machined; the casting then removed by simply loosening the setscrew M. The rapidity with which the work can be handled and machined in this fixture is at once apparent.

The fixture for the second operation on the casting, Fig. 1, is shown in Figs. 4 and 5, and, as will be seen, is rather more complicated than the first. However, it can be manipulated just as rapidly. Fig. 4 shows a plan of this fixture and Fig. 5 a sectional view of it. As will be seen, it consists of a faceplate of the usual lathe type and an angle-iron, which is the fixture proper. This angle-iron has a locating stud and two lugs, U and S respectively: S the locator proper and U for the fastening setscrew W. It will be noticed that the locating stud is reduced at both ends; the end Y to drive into the faceplate and the end R threaded for the nut Q and reduced for the slip washer P. The stud is prevented from turning in the angle-iron by means of the headless screw Z, shown in Fig. 5. Cap screws N fasten the angle-iron to the faceplate. The locating lug S is dished out on the face to conform with the shape and radius of the rib D. All other details are shown clearly in the two drawings and require no further description. A couple of dowel pins—not shown—serve to locate the angle-iron firmly and accurately on the faceplate.

The work is first located on the lathe spindle and fastened in position by first loosening the nut Q and removing the slip washer P. Then the casting is slipped over the locating stud, the hole A fitting the stud at X. This locates the casting true one way. For the other way the screw W is tightened, forcing the casting sideways into the locating groove in the face of lug S. Then the setscrew is located positively by jamming the nut V. The slip washer P and the nut Q of the locating stud locates and fastens the work down securely on the face of the angle plate. Now the base E can be machined and the hole F bored and threaded with ease, and with the certainty that there will be no shifting during the operation. Moreover, alignment of the hole A in the hub with the base and the hole F in the stem in all the castings machined by the use of the fixtures is certain.

There is a large variety of work which it is required to machine in repetition and in large quantities for which fixtures of the types illustrated here will prove adaptable. Their simplicity and inexpensive construction, and the rapidity with which they can be manipulated should commend them.

The Maryland Steel Co. will send to the St. Louis Exposition a large model of the steel drydock, which is being built by the company for the Government. The Navy Department officials are delighted that the visitors to St. Louis will have an opportunity to see on a small scale the docking of a warship. It is proposed to have the model dock placed in an artificial pond and provided with mechanism for the docking of small model ships-of-war.

There has been considerable activity at the Pueblo plant of the Colorado Fuel & Iron Co. in making repairs preparatory to resuming operations. Orders for nails have recently been received from Japan and Alaska.

The appraisers of the property of the Susquehanna Iron & Steel Co., Lebanon, Pa., have filed their report. The total valuations, not including iron in trust, which is appraised at $54,239, make a total of $1,094,873.

It is reported that a contract will be signed with a representative of the United States Steel Corporation, at Constantinople, for the supplying of $1,000,000 worth of material for the construction of the proposed El Hedjaz railway, in Arabia.

CATALOGUE FILING AND RECORD.

BY L. G. STEBBINS.

There are probably as many ways of filing catalogues and other pamphlets as there are different systems of office administration, and very possibly there are more. A great deal of printed matter is sent out which is valuable from many standpoints—practical, literary and artistic. The first is of course the most desirable thing in a catalogue, pamphlet or circular of any kind. This is an intensely practical age, and in the busy workaday life of business enterprise and strenuous effort the

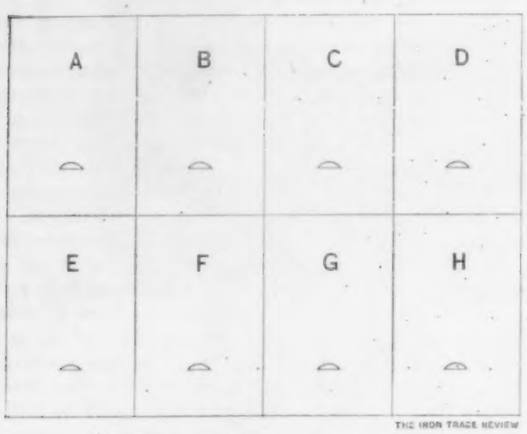


FIG. 1.—THE FILING CABINET.

elements which go to make practical value are the first essentials in a descriptive catalogue.

Many business men will spend hours, days and weeks in getting up a valuable catalogue, yet utterly fail to appreciate other men's efforts in the same direction, since they do not provide an adequate system for filing and recording very valuable information, a great deal of which is not found in any volume outside the catalogue or pamphlets of some business concerns. There is no reason, nor indeed any good excuse, why any business house should fail to have a complete and valuable catalogue file, easily accessible and readily referred to.

Some offices have a somewhat loose habit (it cannot be dignified with a better term) of keeping everything which comes to them in the way of advertising matter, being guided only by the precedent established by the "old man" in the dim past. This results in an embarrassing and overgrown collection, which soon becomes covered with dust, and in the collection

FIG. 2.—INDEXING BY DEPARTMENTS.

probably many duplicates and ancient issues. Such a collection is rendered practically valueless by its very proportions and the lack of order and system in filing it. It is by good luck only if the sought-for catalogue is found when wanted.

Against this method is set up one of throwing away about all the printed matter which comes in, retaining practically none of it. This way is really worse than the former and happily is not a popular one. With this way of doing business much time is lost writing for catalogues covering certain articles required out of the ordinary line of buying, whereas if the catalogues had been filed properly it is very likely that there would be at least two or three showing just what was wanted and there would not be a delay incurred in writing for descriptive matter.

To those who wish to be systematic and orderly in these things (and their name is legion) the subject is extremely interesting and anything which will tend to increase the efficiency and value of the catalogue file is sure to be received with considerable interest. There are very many fairly good systems in connection with this matter of catalogue filing, but a great many of them are inadequate and do not answer the requirements of the case perfectly. It is, to a great many business men, a rather difficult problem to be solved, the various sizes and fantastic shapes of some of the catalogues and pamphlets making the filing of these a somewhat troublesome matter; and were it possible to arrange for a universal uniformity in the issuance of printed matter it would be much easier to take care of it properly.

Of the various methods of filing the writing inclines to the drawer system, and the system described below is based on this method. A cabinet of drawers should be provided as shown in Fig. 1. This can be constructed in accordance with the particular need of the business. It is wise to make the drawers wide and deep, and those shown in the cut are designed for 12 inches deep, 12 inches long and 8 inches wide. These sizes will provide a drawer capable of receiving about all the ordinary catalogues, and the very large ones may be stood up on edge on the top of the cabinet. For the small page and two-page circulars a folder similar to those used in the system of vertical filing should be provided and these circulars placed therein, so that they may not be loose in the drawer.

FIG. 3.—INDEXING BY FIRM NAMES.

A card index should be provided divided into two departments, one containing an index of the catalogues according to the name of the firms issuing them, and the other covering the catalogues according to the list of goods described.

To illustrate the latter and to make it perfectly plain to the reader, we will take the business of a machinery concern. The general requirements in the purchasing line may be divided into the following classes: Power, A; light, B; heating, C; heavy machinery, D; small tools, E; office supplies, F; drafting room supplies, G; pattern room supplies, H; hoisting apparatus, I.

Each one of these various divisions should be given a drawer bearing the letter representing the particular department of the business. The form of index for this division is shown in Fig. 2. These general divisions of the business may be subdivided in order to show quickly in just what drawer a certain catalogue covering a number of different articles is filed. The general heading, Power, would be subdivided to contain information about engines, boilers, shafting, belting, etc. It would be well to make the index comprehensive and complete in order to avoid any confusion in locating a particular catalogue. The subdivisions may be made on back of card illustrated in Fig. 2, or a separate card for each department may be made out and filed in front of the other cards. Fig. 3 shows the method of indexing according to name.

The catalogue filing system should be placed in charge of one man and he should have the entire oversight of it, a librarian, if you please, who will furnish information upon request, and if he is capable and interested in his work a great deal of information will be absorbed which he can dispense

readily and correctly, thus saving time in every direction.

The writer suggests to those who issue catalogues the practical utility of numbering them consecutively, and when a new one is issued, including therein a notice to the effect that "This catalogue supersedes No...." This will prevent in a great degree confusion arising from orders based on an old catalogue, and will do much toward keeping live matter only in the files which is, of course, all that should be there.

As the catalogues come in they should be turned over immediately to the catalogue clerk who will stamp them the date received, index them under both articles and names of firms, and give them the progressive number.

With a little careful attention and at a small cost, this system will give any concern a first class catalogue file, extremely valuable for the information contained therein, and one in which the information can be easily procured, and with no delay. As stated above, a good clerk will very soon absorb a great deal of the information contained in the file, and it is good business policy to allow him, and encourage him to devote a good deal of time to the proper care of the filing system. A liberal education in many directions may be obtained by studying the catalogues as they come in, and in this way the clerk in charge of the file has a chance to broaden his knowledge of various lines of business, and may become a very valuable assistant to the heads of departments. Put a good clerk on this department of office administration, and give him time and opportunity to make the catalogue file a reference library of value for the information contained therein.

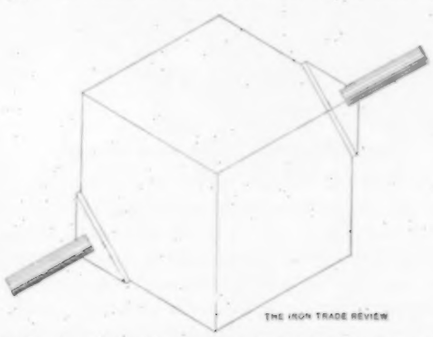
Some of the catalogues contain various information of interest such as tables of engineering information which may be indexed for quick reference.

To many this description may read like a detail of considerable "red tape," but really the work required is very small after the file has been put in proper shape, and the very satisfactory results are out of all proportions to the work entailed and the expense incurred.

SAWING CUBES.

BY ROBERT GRIMSHAW.

Where one has a number of cubes to saw accurately in various diagonal planes (such work comes up not merely for makers of models for scientific purposes, but in pattern-making for architectural foundry work) the matter of holding them, not merely so as not to risk losing a finger, but so as to cut them truly, is important. The trick is easy, and might as well be tried before as after finger amputation. Two squares of tin being cut, a quadrant is removed from each, and the three



HOLDING CUBES OR SPHERES WITH HAND SOCKETS.

remaining quadrants are folded up so as to form a triangular pyramid. To the tip of each of these is soldered, axially, a stout wire. The result in each case is a sort of chuck or holder; and between these there can be held, by using both hands, cubes of any size. Using a long stout bow of springy wire, instead of the two short pieces, one has a spring clamp by which the cube can be held with one hand. Spheres can be held with the same rig.

Dilworth, Porter & Co., Ltd., Pittsburg, have recently placed contract for three direct connected units, the engines for which are to be furnished by the Ball Engine Co., Erie Pa.

TIME SAVING METHODS FOR THE MACHINE SHOP.

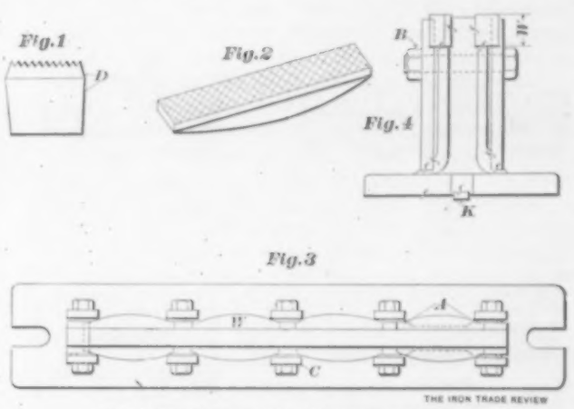
BY FRANK B. KLEINHANS.

A Fixture for Milling Tool Post Wedges.

The only satisfactory material for a tool post wedge is a drop forging. The forgings must be machined on each side in order to bring the wedge up to size and also to give a presentable appearance. Fig. 1 shows an end view of one of these tool post wedges as it comes from the drop forge dies. It will be noticed that draft is allowed at D, to enable one to remove the forging from the dies. The taper is about 1-32 inch in this distance; we must therefore take a cut at least 1-32 inch deep at the highest part in order to true up the sides. The tops of these wedges are serrated as shown in the perspective view, Fig. 2. There is no machine work done on this part, nor on the bottom circular portion of the wedge.

Fig. 3 represents the fixture for holding eight of these wedges in place while the top surface is being milled off. The wedges are shown at W. They take a bearing in two lugs A, one at each end of the wedge. They are held into place by the clamp C. The fixture is first filled with these wedges and clamped and the cutter is then allowed to take a cut, which is just enough to clear the surface. All the wedges in the lot are machined off on one side, and then the milling cutter is brought down so as to give the proper width W (see Fig. 4) for the wedge. After the cutter runs through this setting, the wedges are finished.

The pattern for this fixture is simple and there is little machine work on it. The keys K are made to fit the tee slot on



THE MANUFACTURE OF TOOLPOST WEDGES.

the milling machine table and are short, filed to a driving fit and held in place by friction only.

The clamps are made of rough bar iron. Several turns of brass binding wire are placed on the bolt between the clamp and the fixture. When the bolt B is released, the clamps are pushed out from the fixture; we are thus able to move a setting of wedges and replace another without having the clamps interfere as would otherwise be the case.

Finishing Up Work from the Screw Machine.

No matter how nicely work may be turned out from a screw or automatic machine, there are sure to be some burrs remaining on the piece which must be removed by another operation; then too, the cutting off tool does not give as nice and as smooth a surface as we frequently require on the piece. We are obliged therefore to rechuck these pieces and face them up, at the same time doing any knurling which may be necessary in order to finish up the piece complete.

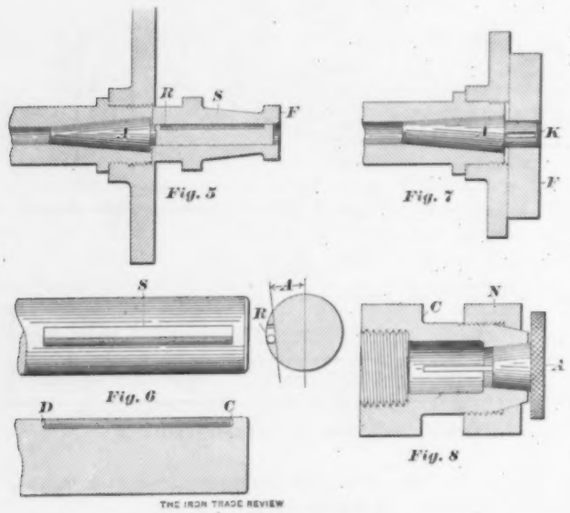
Fig. 5 represents a cross section of a lathe spindle and also of a piece of work. S is a sleeve which must be faced off to a definite figure at F; this sleeve is slipped on a chucking device A, which is driven firmly in the taper hole of the spindle. The roller R of this device is so arranged that any tendency to rotate the sleeve will draw this roller up and firmly wedge the sleeve. A detail of this device is shown in Fig. 6.

The slot S is milled into the arbor so that the lower portion of the slot is at an angle A, to the center line, and of sufficient depth, in order that the roller R will clear in the position shown. The corners of the slot are then chipped out square as shown, the roller is dropped into place and the metal is

calked down at C and D, to keep the roller from dropping out. The end of the roller R is semi-circular in order to admit of the calking just mentioned. This roller is made of a piece of hard drawn steel wire.

The convenience and rapidity with which work can be put on and taken off this arbor makes it very desirable for this class of work. A great variety of work can be done on this form of arbor, especially in the way of knurling or of trimming off courses and shaping up fillets by hand. When the work is of large diameter, we use an arbor, Fig. 7, which has a key K for driving the work. The face F can now be readily trued up. Indeed this method of driving the work is so convenient that it is frequently advisable to cut the key way in this piece in order to drive it in the lathe, even though this key way may not be absolutely necessary on the machine where this piece is used.

When the hole in the work is so small that we are unable to drive it by an arbor, this piece can usually be held in a three-jaw chuck, and any facing, etc., which is necessary can then readily be performed. If the piece is such an odd shape that it is impossible to hold it in a three-jawed chuck, we can arrange a special chuck as shown in Fig. 8. When the boss or piece A is tapered and cannot be held in the regular three-jawed chuck, we then make a special chuck C, which is screwed on to the nose of the spindle and is bored out on the end to fit the piece A. The chuck C is split in several places and the nut N closes these pieces against the work. These chucks are made to a standard size except the portion bored out at A. If for any reason, the diameter of the part to be



CONVENIENCE IN CHUCKING.

chucked is changed, the hole can be bored out and used for another job that requires a larger hole.

Fixture for Milling Square Head Screws.

There are many places in connection with a machine tool where we are required to have a square head screw. The lathe tool post screw is a fitting example of one of these screws. They are turned from round stock and the cutting off tool is fed in a little below the distance across the flat of these screws. After the lathe work on these screws is finished this round end must be milled off to give the desired square. The fixture for holding these screws for milling is shown in Fig. 9.

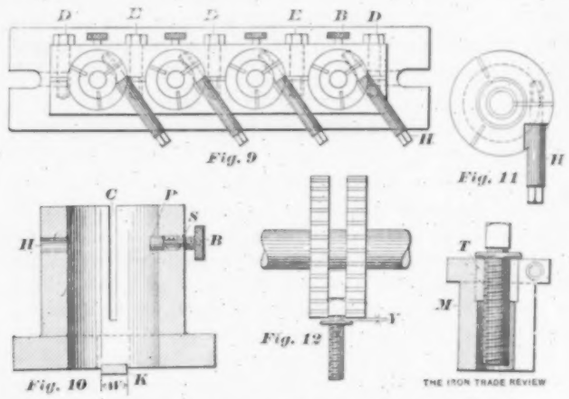
It will be noticed that this fixture is arranged for four screws. It is found that better time can be made in milling these screws in a fixture of this length than can be obtained by the use of a longer fixture. The handles H are provided with a square end as shown, and by screwing these handles, the bushing and the screw can be clamped in position. B represents an index button. After the milling cutter has run through this lot of screws, the index button is withdrawn and the handle H is given a quarter turn. The button snaps in at this point and thus indexes the screws for the second cut.

Fig. 10 gives the detail of this button and also a cross section of the fixture. A hole H is drilled through one side and nearly through the other, then the small hole S is drilled through the remaining portion. The plunger P is then entered in place with a spring as shown and is slipped through the button B and riveted over. A saw cut C splits the fixture from end to end, and is allowed to run almost down to the flange. This saw cut enables one to clamp the main bushings with bolts E, Fig. 9. The two bolts are tightened up to clamp the main bushing while the bolts marked D are used to take up the lost motion in the bushing and when once adjusted are never changed. Indeed if the bushings are properly fitted up, and the clamp bolts D adjusted so as to give a neat fit, it is not necessary to clamp the bolts E for milling the heads.

This fixture is planed to receive the key K, Fig. 10. The width W of this key fits the tee slot in the milling machine table. The key is made a driving fit and is held in position by friction only. They are thus readily removed, which enables one to apply the fixture to other machines requiring a difference in the width of the key W.

In Fig. 11 is shown the main bushing M with a handle H screwed in place. This bushing is split half way through in two places and all the way through at a third place. This bushing is bored out to receive the screw bushing T. The bushings are bored to receive different size screws and are split on one side as indicated. As there is no thread cut in these bushings, we save the time of screwing these long screws into place. The screws are dropped into the bushings and are clamped by the outside of the thread only. It is necessary to clamp the bushing T to the bushing M so that there is no possibility of any movement of the screw during the time of indexing, otherwise the head would not be square.

Small holes are drilled into the bushing M at right angles to each other and in line with the index piston P, Fig. 10. The arrangement of the milling cutter is shown in Fig. 12.



THE HEADING OF SCREWS FOR MACHINE TOOLS.

The width Y of the cutting of tool groove gives a chance for considerable variation in the height of the table.

The British Open-Hearth Steel Industry.

Statistics collected for the British Iron Trade Association show that there are now in Great Britain 106 open-hearth steel works, of which 27 are in South and North Wales, 24 in the Sheffield and Leeds districts, 19 in Scotland, 17 on the Northeast Coast, 10 in Lancashire and Cumberland, and 9 in Staffordshire and other districts. In 1898 the United States had 128 works, reduced in 1902 to 99. Since 1902 the number of plants in the United States has been considerably increased. The plants of large capacity in the United States are more numerous than in Great Britain and the average size of the units is greater. The first open-hearth works built in Great Britain to produce commercial steel were started about 1868.

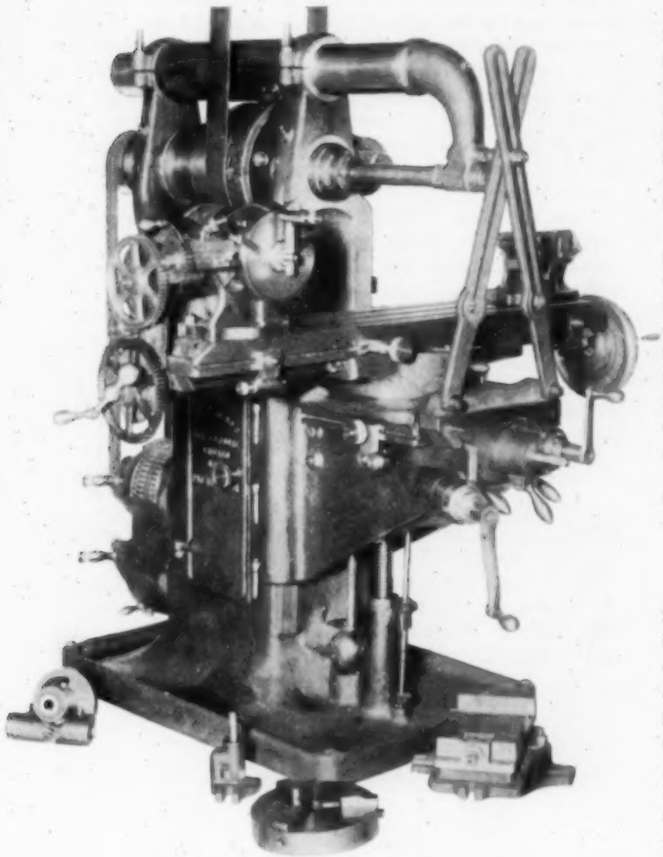
The Mary Pratt Furnace property, of Nashville, Tenn., has been sold by the Alabama Consolidated Coal & Iron Co. to the Alabama Great Southern railroad for $80,000. The property consists of 30 acres and a dismantled furnace which was abandoned several years ago. The purchasing company will use the property for terminal facilities and yards. The furnace was built in 1883, but was never a success, being too small to operate at a profit.

A NEW MILLING MACHINE.

John B. Foote, of the firm of James & Foote, Chicago, has obtained a patent recently on a new milling machine. The firm for a number of years has conducted a milling and gear cutting business requiring a wide range of milling machine operations and the present machine is the outgrowth of this experience. The inventor has had in view a tool of universal type and convenient manipulation, with simple but ample feed mechanism and in building the machine has incorporated the very practical virtues of large surfaces on all the slides, automatic feeds in all directions and quick return on all feeds.

The feed box mechanism is new and has 26 distinct changes of feed, varying from .0025 to .250 by moving the index handles shown in the halftone. The arrangement of the feed levers in the front of the knee enables the operator to reverse or throw in and out all the feeds while standing in the one position. The platen has a quick return of four to one, the vertical feed a quick return of 2½ to 1 and the transverse feed has a quick return of 1½ to 1.

The base of the universal slide is a full circle 14½ inches



A NEW MILLING MACHINE.

diameter graduated to degrees, which has an annular T-slot to receive the heads of binding bolts. This allows the platen to swing 90 degrees without removing the bolts. The platen clears the column at 65 degrees angle. The face of the main column is concaved to receive the circular base when at the inner limit. This circular base being of large diameter gives a rigidity equal to the ordinary plain milling machine.

The spindle bearings are of the self centering type with taper bearings, self-oiling and self-adjusting in phosphor bronze journals, capable of high speeds without locking spindle from expansion caused by friction.

The elevating screw in knee is fitted with ball thrust bearings and very sensitive to adjustments. The feed motions are carried to the knee by a horizontal shaft, passing from feed box through the base of the machine to a pair of inclosed mitre gears and thence to mechanism in knee by a vertical shaft back of elevating screw. This avoids the common universal joint, and gives a uniform feed motion for all positions of knee, leaving the work acted upon free from waves.

All binding screws are made with attached wrenches. All slides are 45 degrees, and of generous widths, hand scraped.

The spindle is made of hammered steel and is hollow. The front end has a No. 10 or 11 Brown & Sharpe taper hole. The spindle has a ½-inch slot, milled across the end for driving cutter arbors, nose is 2½ inches diameter, with ten U. S. standard threads per inch, right hand, and is provided with a guard collar, which may be used for forcing out cutter arbors.

The driving cone has four steps ranging from 6¾ to 12 inches in diameter for 3-inch belt, and is back-geared 6 to 1. Back-gears are fully protected.

The overhanging arm is 4¼ inches diameter and has a steel sleeve for holding the self-centering bearing for end of cutter arbor. Both may be removed for the new rack cutting and vertical mill attachment. The attachment is capable of cutting 4 pitch racks. The rack-cutter may be placed at any distance in or out from the column in cutting spiral gears. Distance from center of spindle to arm is 6½ inches.

The table is 45 x 9 inches, the working surface is 42 x 9 inches, with three slots 21-32 inch wide.

All feed mechanism in the knee is contained in a box bracket, which can be quickly removed when desired.

The dividing head provides for a large worm wheel, 6 inches in diameter with 40 teeth, 7 pitch. The head can be rotated on its own axis 190 degrees, thereby enabling the operator to use the head on either end of platen. The indexing dial is mounted on the axis of the head, allowing the use of the large dial without interference with the work. Rotation is given to the worm from the indexing shaft through gearing on the inside of the head, free from dirt and chips. The worm can be disengaged for plain indexing. The wormwheel is of standard form, made of two plates doweled and screwed together. The parts are repeatedly shifted relatively to each other during hobbing so that local errors are gradually eliminated. The head has a circular base which can be mounted on the graduated base of the vise and its spindle set in alignment with the milling machine spindle whatever the angle of the table. The head swings 12½ inches over the platen and 16½ inches when placed on the base. The tailstock can be elevated by a vertical screw graduated to thousandths, and swung to an angle of 20 degrees out of the horizontal.

The floor space required is 100 inches by 70 inches, and the net weight is 3,250 pounds.

Threatened Tool Steel Litigation.

News has been received in Sheffield that the Bethlehem Steel Co., of the United States, has commenced proceedings in the American courts against several American users of high-speed tool steel, made in Sheffield and the United States, for alleged infringement of the Taylor-White patents of treating tool steel, which are owned by the company named. It appears that under the American patent laws cause of action for infringement of a patent lies against the user, not against the maker or distributer, of the alleged infringement, although, for obvious reasons, the maker usually maintains the defense. Several of the principal crucible steel manufacturers in Sheffield are interested in this action, for it is their steel (with American brands) which has been used, and they are acting together to defend the suit—not from fear as to the result of a trial, but in order to prevent the plaintiff company gaining a verdict by default, which might shut out of the American market all brands of tool steel except that of the Bethlehem Co. The Sheffield tool steel makers profess absolute confidence in the result of the proceedings, and they declare that the announcement that the action had been lodged came as a great surprise to them. Few, however, have any fear that the action will actually be brought into court.—[London Ironmonger.

The Railway & Electric Equipment Co., Buffalo, N. Y., has succeeded to the business of railway equipment and electrical supplies formerly carried on by Charles F. Johnson.

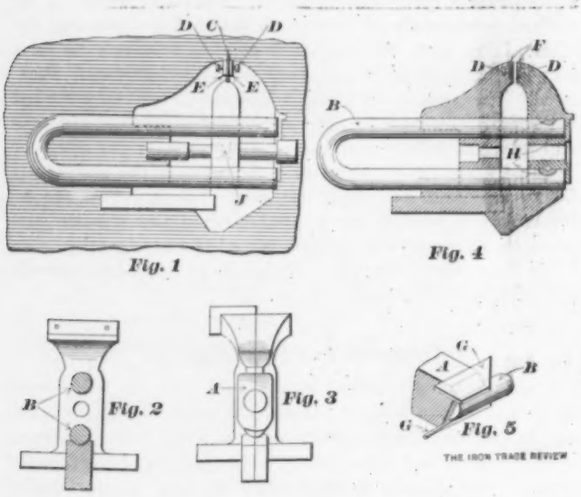
The Pusillon Tool Co., Buffalo, N. Y., has been declared bankrupt and N. McKnabb appointed trustee.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

Vise Manufacture in the Foundry.

The ordinary vise of the shops comes in the category of machines, though the parts are few and of simple if rugged construction, and gets an amount of rough usage not often the lot of most mechanism. The device is open to receive and hold anything that may be thrust between the jaws, and as the shape of the latter may not be suitable for a firm grip by the vise at the usual pressure, the tenacity is often increased by the liberal application of a too convenient lever and screw. The vise has been known to take the place of a small hydraulic press and in other ways accomplish work for which it is not likely to have been designed. The factor of safety or ignorance is therefore large as a general rule. The system of vise manufacture here described will be of interest from the well known rigor of the service the vise must perform in order to fulfill its destiny and will be the further worthy of notice on account of the use made of foundry practice in the production of the appliance.

Briefly stated, the invention of Joseph L. Ware, of St. Paul, Minn., consists in forming a vise at a single casting with a fixed as well as a movable jaw in combination with a single or double yoke, the latter arranged to slide through an opening in the fixed jaw and at the same time united in the casting



THE MAKING OF VISES IN MOLDS.

process to the movable jaw. Fig. 1 is a view of a mold for this purpose, an ordinary sand mold and by the one operation a complete vise is cast, requiring when it is removed from the mold a tap running through the hole for the screw and the insertion of the adjusting screw in the threaded opening. Fig. 2 is a section of the pattern from which the vise mold is made. Fig. 3 is an end elevation of the pattern seen in section in Fig. 2. Fig. 4 is a longitudinal section of a vise as constructed by this method and Fig. 5 is a perspective view of the parting plates at the intersection of the jaws and the bar.

The mold is made by means of the pattern A having a core print for the space to be occupied by the yoke B, which is left in the mold and thus becomes a part of the vise. The pattern has jaws, a base and a print for the adjusting screw core. A parting strip C made of metal forms a division between the two parts of the mold and separates the jaws at this point. A metallic core plate E fits on each side of the parting strips C to form shoulders for supporting the steel jaw plates. Rivets D are placed in holes in the cores and are cast in the jaws with the ends projecting out and over the shoulders. The face plates F are riveted to the jaws by means of the projecting pins at D. The parting strip C extends beyond the cores at the top and the molder can conveniently level and plumb the cores when placed in the mold. The yoke B is of U shape and has the parallel arms at right angles to the plane of the jaw faces. The forward end of the lower arm serves as a parting at that portion of the mold forming the lower end of the movable jaw and separates the two jaws there during the casting operation.

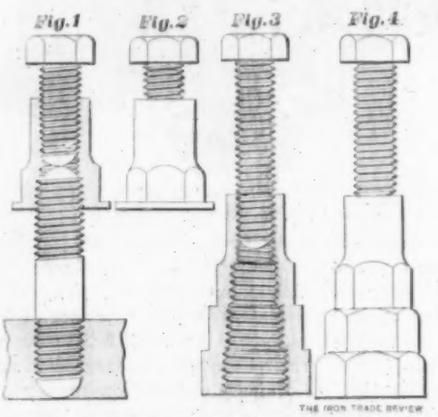
The inventor has found in molding that the sand will be drawn out in such a thin edge between the pattern and the lower arm that when casting the molten metal will wash away the sand and form a web between the jaws. This of course requires so much additional labor in finishing the vise. He proposes to get around this difficulty by providing thin metal parting strips G resting upon the lower arm and separating the jaws in order to prevent any union of an undesirable character. Fig. 5 shows a portion of the pattern of the lower jaw A, a section of the lower arm B and the parting plates resting upon them.

The mold is shown in Fig. 1 after the pattern has been removed, leaving the cavities for the metal and also showing the bent steel yoke as it lies in the mold, together with the screw core for the openings in the two jaws. The jaw facings E are also seen in position in the mold. A steel block J is placed in the mold to prevent the two parallel bars of the yoke B from moving toward each other when the metal is poured. There is an opening through the block J for the adjusting screw core.

When the metal is poured into the mold it forms about the ends of the steel yoke but the parts of the arms that are to be within the stationary jaw of the completed vise are covered with a thin coating of glue and sand or in any similar manner protected from direct contact with the hot metal. The parts of the steel arm that come within the movable jaw have a series of notches H, into which the metal runs and keys the jaws in place. The ends of the steel yoke may be tinned before the bar is placed in the mold in order that a practical weld is obtained when the hot metal flows around the ends.

A Patent Office Discovery of a Well Known Tool.

A stud threaded at both ends may be inserted into a tapped hole in sundry ways dependent upon the training of the workman, the workshop conveniences and other peculiarities of the task and the surroundings. The common practice consists in the use of a nut plugged at one end with a setscrew. The ordinary thin nut does not cover very many of the threads after the setscrew has been assigned enough for hold-



STUD-DRIVER INVENTION IN ENGLAND.

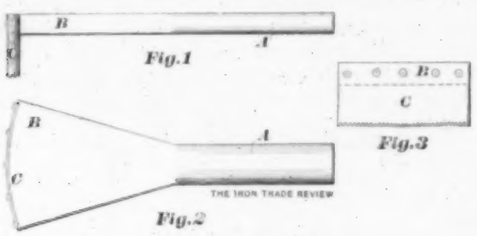
ing purposes and a long nut is more suitable for the job. The nut is screwed on what is to be the outside end of the stud so that the setscrew and stud are metal to metal and the nut is then to all intents and purposes the head of the combination. The stud is now set down to the requisite depth with a wrench, the setscrew backed out and the nut removed. A couple of nuts on the jam nut principle are sometimes employed, but the former method, particularly if the checking setscrew has a fine thread for easy removal, seems preferable. All this is so

generally known that a recital of the particulars is only worth while for the purpose of comparison.

An English patent has been secured by E. Ravet, of London, on a stud-driver, which is thus described and illustrated: The object of this invention, Figs. 1 and 2, is to provide an improved appliance affixable to a screw stud, and whereby the stud can be easily screwed into place. The apparatus comprises a screw nut of greater depth than usual, and the screwed part thereof is preferably of two diameters, one diameter of screw-threaded hole encircling the stud, and the other for reception of a screw bolt, whose end engages the end of the stud, and on being tightened somewhat, tends to draw the nut towards it, and in so doing tightly clamps the nut to the screw thread of the stud, so that when the nut is operated by a spanner the stud will be turned without fear of slip. To release the appliance, all that is necessary is to turn back the lock-bolt, when the grip of the nut will be released, and the while appliance be free to be removed by hand. The nut may have a tapering series of stud-holes of two, three or more diameters, as in Figs. 3 and 4, so as to be applicable for various sizes of studs.

The Cleaning of Files.

A file scraper has been invented by Harry L. Adams, of Dexter, Mo. An effective device for cleaning out the file flutes may at the same time be destructive of the cutting edges



A FILE SCRAPER.

of the teeth and the inventor advises the use of a material which will not damage the file whilst in operation. Tin is such a substance and the scraper of soft iron has a thin coating of the metal applied to the surface.

The arrangement is of the simplest character. Fig. 1 is a side view of the scraper; a plan view is seen in Fig. 2 and an

FIG. 4.—THE SCRAPER IN USE.

end elevation in Fig. 3. The device is shown in operation in Fig. 4. A is a handle with a curved plate B. The scraping blade C is made of thin and soft sheet iron coated with tin on each side. This blade is fastened to the curved plate B and the curvature supplies the necessary stiffness. The blade C has a finely toothed scraping edge which soon fits the number of teeth to the inch on the file.

An Improvement in Nail Adhesion.

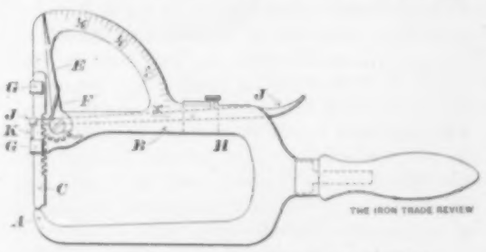
A Massachusetts inventor, E. S. Morton, of Brockton, proposes a novel method of roughening the surface of nails in order that they may adhere the more firmly into the wood or other substance into which they are driven. He roughens the nails by immersion in an acid solution, exposure to water or in any other manner which will produce rusting or oxidation. Then a paste is applied to the surface consisting of a mixture of combustible fluid and some powdered material. Linseed oil and silica are advised, though other oils with lampblack or whiting are mentioned. The nails thus treated are subjected to heat, the oil burned off and the residuum baked on the surface. The coating is further roughened by tumbling, either by a subsequent operation or by the use of a tumbler adapted for heating. The inventor claims that the powdered material adheres with such firmness to the nails that it cannot be removed by the pressure of the substance into which the nail is driven. Oil is not claimed as the essential ingredient in the mixture and any other material which will form a paste with a refractory powder and be dissipated by the action of heat comes within the scope of the patent.

Caliper with Magnifying Qualities.

The use of a single-handed caliper with magnifying qualities is frequent in pattern making, as, for example, in the delicate gauging of the thickness of stove work and the carving out of even depths under irregular and some regular surfaces. The appliance here described has of course a larger field, including metal working, as will be seen from the engraving. The tool is intended to be stamped out of sheet steel with lugs turned over to hold the rack and lever as well as the setscrew.

The inventor, William Reilly, of Waltham, Mass., provides a U-shaped stock with a shank for a handle and having on the lower arm the fixed clipper jaw A. An upper jaw B is offset from the plane of the lower jaw A and forms a guide for the movable jaw C. The movable jaw slides on the offset portion and is in the same plane as the lower jaw A. The upper jaw has rack teeth meshing with a gear segment D on the hub of a pointer E pivoted to the upper arm B. The jaw C is prevented from sidewise movement by the gear segment and the lugs G overlapping the edge.

The jaw C and the pointer E are held in the initial position, as illustrated, by means of a spring F. The spring is coiled on a pivot and one end is engaged with the arm B whilst the other is in contact with the pointer E, and therefore tends to force the latter toward the left and bring the jaws together. A lever is pivoted at H to the arm B. One arm of the lever J is bent to form a tooth, engaging a notch in the movable jaw, so that when the handle end of the lever is depressed the tooth and jaw will be raised. Any movement of the jaw C causes



CALIPERS FOR PATTERNMAKERS AND OTHERS.

the pointer to swing over the graduated scale. An adjustable setscrew limits the upward movement of the handle end of the lever and may be used to hold the jaw at any desired distance from its neighbor. A stop K limits the downward movement of the lever and prevents the movable jaw from overlapping in case the body of the device has been sprung to throw one jaw out of the plane with the other.

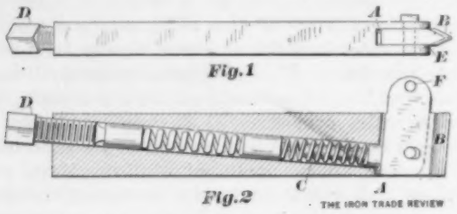
The Yield of a Cutting Tool.

The patent of Louis W. Gates, of Westhaven, Conn., relates to thread cutting, cutting off tools, etc. He says in brief:

"It is one of the objects of this invention to provide a tool which shall be relatively inexpensive to produce, will do the work required of it both faster and better than ordinary tools, will wear much longer than other tools of like character, as breaking of the point of the cutter is prevented, and which can be run by an apprentice, as little skill is required in its use, thus doing away with the necessity for a skilled workman, as is required in operating an ordinary rigid tool. It is of course well understood that workmen of more than ordinary skill are required for the successful general use of ordinary rigid metal cutting tools. When a cutter is 'overloaded,' as it is termed in use, the tendency is to tear out metal in irregular pieces, leaving a rough thread. If the metal is soft, the tool frequently clogs, and if hard or if there are hard spots it breaks out the metal irregularly. There is likewise great danger when a cutting tool is overloaded of breaking the point of the cutter. In using my novel yielding cutting tool

the operator can tell by the chip if there is enough or too much tension upon the spring or springs, and can readily adjust the tension by the sense of touch without moving the tool or the carrier therefor, so as to cut a clean smooth thread and avoid danger of breaking the cutter."

Many mechanics have a possibly mistaken notion that a rigidly held tool for machine operations is a necessity, but if the preamble to the patent specifications is correct some modification of opinion is needed. Many tool retaining screws have been made too large and much vigorous employment of



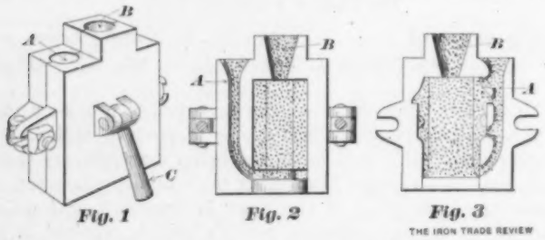
REMOVING THE RIGIDITY OF TOOLS.

wrenches wasted in the effort to hold things where they were put to stay. Some of the struggle with the shiftiness of mechanical grips was doubtless of an exaggerated type, but the average mechanic does not take avoidable chances and errs on the safe side, an expression in the parlance of the shops which means a measure of excess in proportion to the merit of the measurer. The rigid holding of a tool to the cutting depth of accurate work has been found essential for rapid repetition operations, as the material cut may vary slightly in diameter as well as degree of hardness, qualities which may not be constant even in the one piece of stock, much less likely, therefore, in a large number.

The invention is shown in a number of forms in the specifications and one of them has been selected for illustration. Fig. 1 is a plan and Fig. 2 is a corresponding view. The body of the tool has a recess A to receive the cutter B and is bored at C, the latter hole having an adjusting screw D. The shank has ears E and the cutter is pivoted between them at F. The oscillation of the cutter is limited by a pin and there is a spring, one or more, between the cutter and the body of the tool. Fig. 2 shows a couple of springs, the intention being to have the first spring take up the pressure during light work. The light spring would be compressed in doing heavy work until the shank of the bearing plug engaged the plug between the two springs and then the additional pressure would be taken by the stouter spring.

Brass Casting Manufacture.

Frank J. Friese and John E. Gilbert, of St. Louis, Mo., say that "where it can be done, it is much cheaper to make metal castings in metallic molds than it is to make them in sand molds, inasmuch as a metal mold can be used indefinitely, while a fresh sand mold has to be made for each casting. Heretofore it has not, to our knowledge, been practicable to make brass castings in metallic molds owing to the difficulty of



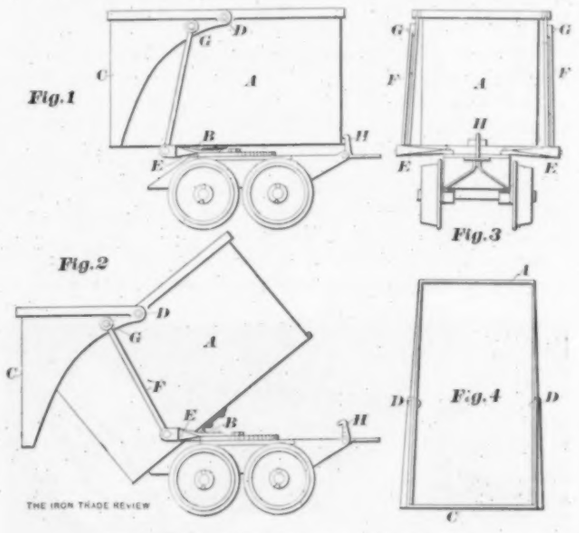
THE FACING OF MOLDS WITH ALUMINUM.

getting the molten metal to lie smoothly against the metallic mold, the result of previous efforts in this direction being that the casting would have rough and porous surfaces. After a series of experiments along this line we have discovered that if the interior of a metallic mold is coated with an aluminum paint the molten brass will lie quietly to the surface of the mold when introduced, the result being a perfectly smooth and uniform casting, and we are thus enabled to avail ourselves of the economy of using metallic molds for the production of brass castings, and to this end our invention consists of a metallic mold for making metal castings, the cavity of which is coated with finely divided aluminum suspended in a suitable carrier."

Fig. 1 is a perspective view of a metal mold which may be of any desired shape and size to suit the casting. Fig. 2 is an inside view of one-half the mold, with the connection bolts in cross section. Fig. 3 is an interior view of the other half of the mold. The mold selected for illustration is formed for making "brasses" for car axle boxes, and is in two parts, clamped together. The halves are seen bolted together in Fig. 1 and separately in Figs. 2 and 3. The mold has an ordinary type of gate A formed in the two parts of the mold and at one side of the mold cavity. One-half the mold has sprues leading from the gate into the mold cavity, as shown in Fig. 3, and each half has a handle C by which it may be readily moved. The interior of the mold and preferably the inside of the gate A and vent B is coated with an aluminum paint, as indicated by stipple marks in Figs. 2 and 3. The inventors have found a single coating sufficient for making a number of castings, but if the mold is used constantly recommend a fresh coat of the paint every day.

A New Ore Car.

George G. Newcomb, of Denver, Col., has an improvement in ore cars. The object in view is the production of a car capable of being dumped smoothly and thoroughly. Fig. 1 is a side elevation of the new car and Fig. 2 shows the car in dumping position. Fig. 3 represents a rear elevation of a car and Fig. 4 is a plan view of the car body. The inventor submits that



THE DUMPING FACILITIES OF A NEW ORE CAR.

serious difficulty has arisen through the fact that when discharging the load the ore binds against the sides of the car and causes them to spread. The degree of expansion at each discharge may be small, but in time the bulge is quite perceptible and sometimes amounts to a number of inches, reducing the effective dumping rate and shortening the life of the car.

The new car has a common truck with turntable, on which the car body A is mounted with hinges B, allowing the swinging of the body in a horizontal plane as well as tilting vertically in any direction. The car body is wider at the discharge end and is also wider at the bottom, the flare of the sides downward and forward facilitating the ore discharge, the contained ore constantly moving into portions of the car body of greater area than that previously occupied.

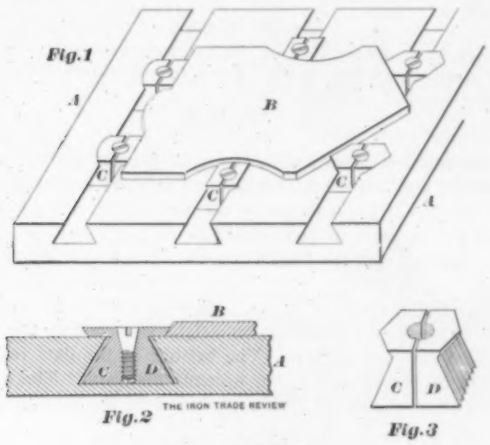
A gate C normally closes the forward end of the car body and has side webs enclosing the sides of the body B and pivoted to them at D. There are brackets E fixed to the table with eyes for links F engaging the webs at G. The pivot points D and G are spaced so that the gate C will be retained in a vertical plane, regardless of the position of the body A. A latch H is employed for locking the body in the horizontal position.

The car is dumped by first tripping the latch H and then

tilting the body upon the hinges B. The gate C now swings upon the pivot D, the link F moving with the longitudinal movement of the car body but limiting the gate C against vertical motion. Of course the wedge shape of the car body is such as will permit of the ready discharge of the contents even if the walls are slightly distended from the impact of heavy loads in filling.

Clamps for Machine Tool Tables.

Fig. 1 is a perspective view of the bed of a machine tool provided with the clamps invented by Dyer T. Kendrick, of Boston, Mass. Fig. 2 is a transverse section and Fig. 3 a perspective view of the clamp. A is the bed of a machine on which a piece of metal B is to be fastened. The grip will of

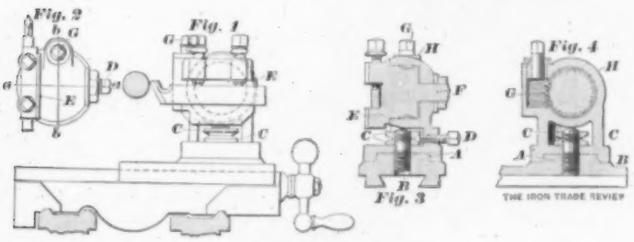


SOME TABLE CLAMPS.

course be improved when the edges of the piece B are beveled as depicted in the illustration, but this is not always the rule with metal handling requirements. The clamp is in two parts, the blocks C and D with the flat surfaces fitting together. The lower portion of each of the blocks flares out like the sides of a wedge and the inclined surfaces are serrated with a number of parallel grooves. The head of the clamp is beveled and the ends may be angular, rounded or otherwise shaped to fit against the edges of the plate, as seen in Fig. 1. The blocks are paired and inserted into the slots of the machine bed. A screw fits in the bore of the blocks and when this is tightened the conical head spreads them as it seats and the serrations are in firm contact with the sides of the groove and the edge of the plate B.

Tool Rest for Lathes.

A tool rest in which the holder is mounted to turn about a horizontal axis to elevate or depress the cutting point has been patented by Henry M. Darling, of Seneca Falls, N. Y. Fig. 1 is an end elevation of a lathe tool carriage provided



A NEW TOOL POST.

with a tool rest of the new design and showing a portion of the lathe bed in section. Fig. 2 is a plan view of the tool rest. Fig. 3 is a transverse vertical section on the line a-a in Fig. 2, and Fig. 4 is a longitudinal vertical section on the line b-b in Fig. 2.

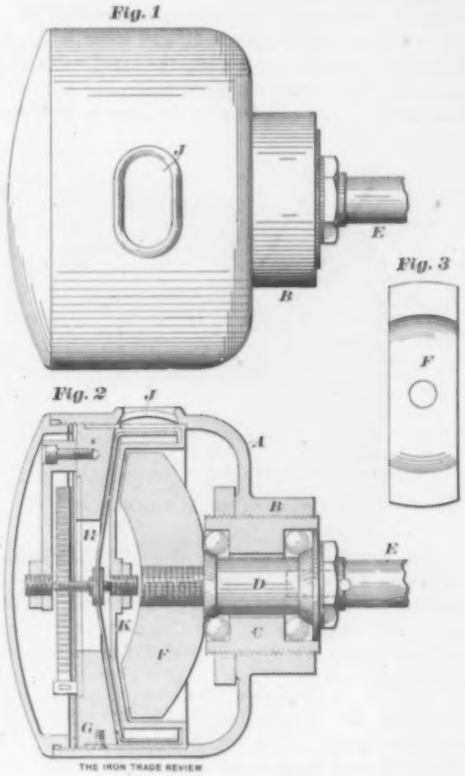
The top of the slide rest has a conical boss A, which projects into a socket in the bottom of the tool post. B is a bolt fitting in the threaded opening in the boss A and projecting into a nut recess in one side of the post. A nut and washer C in the recess fit the end of the bolt B, the nut being knurled for turning by hand. The facing sides of the nut and washer C are beveled to form a V-shaped groove between them. The conical end of a setscrew D projects into this V-shaped groove. When the tool post has been turned to suit the operator, the nut C is used to clamp the post in position. Then the setscrew D is forced against the beveled faces of the nut and washer.

The tool holder is seen at E and has a cylindrical body fitting snugly in a socket at one side of the upper portion of the tool post. The tool holder has a stem F threaded at the end for a check nut. The tool holder has worm gear in mesh with a worm G, the latter having a shaft with squared end for a wrench.

Measuring Rotative Speeds with One Instrument.

A magnetic tachometer has been invented by Arthur P. Warner, of Chicago, and Charles H. Warner, of Beloit, Wis. Fig. 1 is an elevation of the device. Fig. 2 is a longitudinal section along the axis and Fig. 3 is a detail view in front elevation of the magnet seen in Fig. 2.

The casing A has a hub B threaded to fit a block C. The shaft D of the instrument is journaled within the bearing block C upon ball bearings retained by cone collars. E designates a shaft of which the rotative speed is to be measured. This is coupled in any convenient manner to the shaft of the



A MAGNETIC TACHOMETER.

instrument. A permanent magnet F is mounted on the instrument shaft and securely fixed within the casing is a mass of iron G. The inventors prefer to have the iron in the form of a ring and dish the face on the side presented to the poles of the magnet F.

Between the iron G and the magnet F is a rotary disc H of conducting material, as aluminum, and having a graduated flange, as shown through the opening R in the casing in Fig. 1. The scale disc is mounted on a pin having pointed ends to fit the seats in screw plugs. One of these plugs is inserted in an arm attached to the mass of iron G, and the other is placed centrally in a shield plate K of non-magnetic material interposed between the scale disc H and the magnet F and fixed within the casing. A hair spring yieldingly opposes the rotation of the disc and is attached to the mass G and the pin shaft. The casing, shield disc and arm are made in practice of some non-magnetic material as brass. The scale disc is calibrated by adjustment of the pole faces of the magnet F nearer or farther from the magnetic mass G.

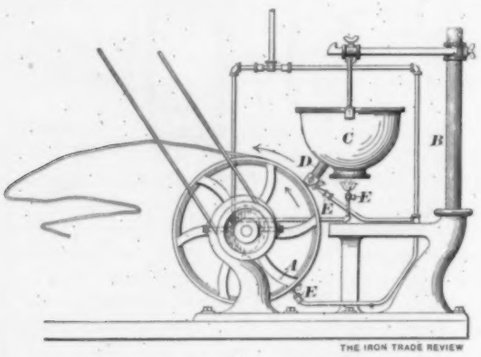
When the instrument shaft is connected to a rotative shaft E, the magnet F is rotated in unison. By means of the cur-

rents created in the circuit, including the magnet F and the mass of magnetic material G, a rotative tendency is imparted to the scale disc H, and when the latter is correctly calibrated the exact speed of the shaft will be indicated through the opening R in the casing.

Fibering Metals.

The improvements devised by A. L. Cole, of Auburndale, Mass., relate to machines for fibering metals. The machine has a wheel A with supporting shaft and belt pulley. The periphery of the wheel A is flat and in the center of the face is a groove of semicircular cross section. Other grooves of different forms may be added to the wheel for securing a variation in the filament shapes. The framework consists of a table and the supporting standards. One of these extends above the table and in the upper face is set the shaft B. An adjustable bar extends from B and supports the reservoir C holding the hot metal. A nozzle D at the side of the reservoir is regulated by a small valve. There are three Bunsen burners E under the receptacle C, turned against the nozzle D and under the wheel A. The nozzle D is almost in contact with the wheel A and at about three-quarters of the height of the wheel.

The metal to be fibered is placed in C and the burner underneath lighted. The wheel A is always turned that the ascending side is toward the receptacle C, and when it has been so heated that the metal will not stick, the small valve is opened in D. As the thin stream of metal strikes the ascending side of the wheel A it is carried up in the groove, and on reaching the top is thrown from the wheel by centrifugal force, cools in the air and comes down as a long, round metallic fiber. The inventor states that by adjusting the flow of metal through the nozzle and regulating the speed of the wheel, "metal fiber can be made in any size from that of a fine hair to that of a common string."



THE MAKING OF METAL FILAMENTS.

Concerning the statement, which has been made by Canadian newspapers, that the American Seeding Machine Co., on account of depression in business, would not carry out the plan of establishing a branch factory at Brantford, we are advised by the company that, not on account of depression in business, but owing solely to the fact that it could not get possession of the factories in time to turn out work for 1904 trade, it was decided to abandon the project for the present. The company states that the trade outlook in Canada is first class and that the company is doing a very fine business.

With the entrance of the Pere Marquette railroad into Chicago, traffic arrangement has been made between that system and the Bessemer & Lake Erie and the Elgin, Joliet & Eastern railroads, making it possible to ship from Pittsburg to Chicago and the Northwest via the Pere Marquette. The route will be from Pittsburg to Conneaut, thence via Bessemer and Pere Marquette ferries to Rondeau on the north coast of Lake Erie. Connection will there be made with the Pere Marquette and the shipments go thence to Chicago.

In the case of the bankrupt Buffalo Spring & Gear Co., Buffalo, N. Y., the final dividend has been ordered. Creditors will realize about 20 percent of their claims.

SYSTEM IN HANDLING FREIGHT CLAIMS.

BY S. E. EMMONS.

System is of the utmost importance to the successful management of any branch of business. Every detail must have attention, and all records should be beyond reproach. The freight claim department of one of our largest manufacturers of steam fitters' supplies, has an original, and effective method of taking care of the details. The system in use is here described with the hope that it may be of benefit to others.

In the first place, all quotations made to customers are stamped like Fig. 1. This forms the basis of all claims audited. Each day the shipping department turns into the billing department a memorandum of all goods shipped, giving the number of packages, boxes or barrels, and the gross weight of each shipment complete. The route is also given.

Freight allowed on shipments, viz:
Iron Fittings 500 lbs.(one barrel)and upwards; I.B. Valves, Brass Goods and Tools, of our manufacture, 300 lbs. and upwards, to

FIG. 1.

When the bill is entered in the sales book, a note of the boxes, etc., and the route is placed at the bottom of the charge. This together with the weight acts as a "mark" for locating the charge on which the claim from the customer applies. A stamp, Fig. 2, is placed in the left hand margin of the sales book opposite the charge. The weight is placed in the space provided for that purpose. The balance of the data required is filled in when the customer presents his claim. The freight claims are governed by a rule appearing on the invoice, i. e.—

W'T RATE
AM'T
CREDITED

FIG. 2.

CREDITED
FOLIO
THE IRON TRADE REVIEW

FIG. 4.

freight claims must be made within 30 days from receipt of goods, and must be accompanied by the paid freight voucher. By referring to the ledger the folio of the invoice can be located which is covered by the freight voucher.

The rate on the freight voucher is compared with the rates kept on file by the card system; see Fig. 3. If the rate does not correspond with the freight receipt, the shipment is looked up, and if there still appears to be a discrepancy either in the rate or the weight, a claim is put in against the railroad issuing the paid freight vouchers.

If the customer is not entitled to the claim it is simply returned, with the reason for not allowing written across the bottom. If thereafter he embodies the claim in his settlement he must have the amount placed to his credit, and a separate entry made charging same back, with an explanation. As is generally the rule the customer is entitled to the claim. In this event, a stamp, Fig. 4, is placed opposite the amount of the freight. When the credit is entered giving the date of the claim, and of the invoice against which it was applied, spaces as seen in Fig. 4 are filled in with the date of the credit, and the folio number. The freight claims and freights deducted in settlements are afterwards placed on file for further reference.

	L.C.L.	C.L.	L.A.R.	FROM	VIA
Brass Valves					
Brass Pipe Fittings					
Iron Valves					
Iron Pipe Fittings					
Malleable Fittings					
Iron Vises					
Iron Tongs					
Minimum Charge					

THE IRON TRADE REVIEW

FIG. 3.

If this system is conscientiously carried out at all times, it is always possible to keep freight claim matters right and if a customer should by some oversight make a duplicate claim, it is easy to detect it.

PNEUMATIC DRILL AND HAMMER.

The Standard Railway Equipment Co., of St. Louis, manufactures the Monarch pneumatic tools. This line includes riveters, calking and chipping hammers, metal and wood cutting drills, forges, painting machines, hoists, etc. These are of various sizes and as a class cover the shop equipment demands generally of pneumatic apparatus.

The drill seen in Fig. 1 has the few parts balanced and each of these with plenty of metal for hard service in order that the operator may get maximum results for the air consumption. The motor is made with two valves, four cylinders, four pistons and two cranks; the piston, rod and strap are in one piece. The crank bearings are rollers, and the cranks are drop forged with a soft interior and a hard exterior, giving toughness with a hard wearing surface. The blank gears are drop forgings, with malleable iron case. The valves compensate for wear, as the thrust is direct toward the seat. From the fact that the cylinders and valves are not a part of the case, being entirely independent, any indentation of the case from falls, rough usage, or from any other cause, cannot injure the motor.

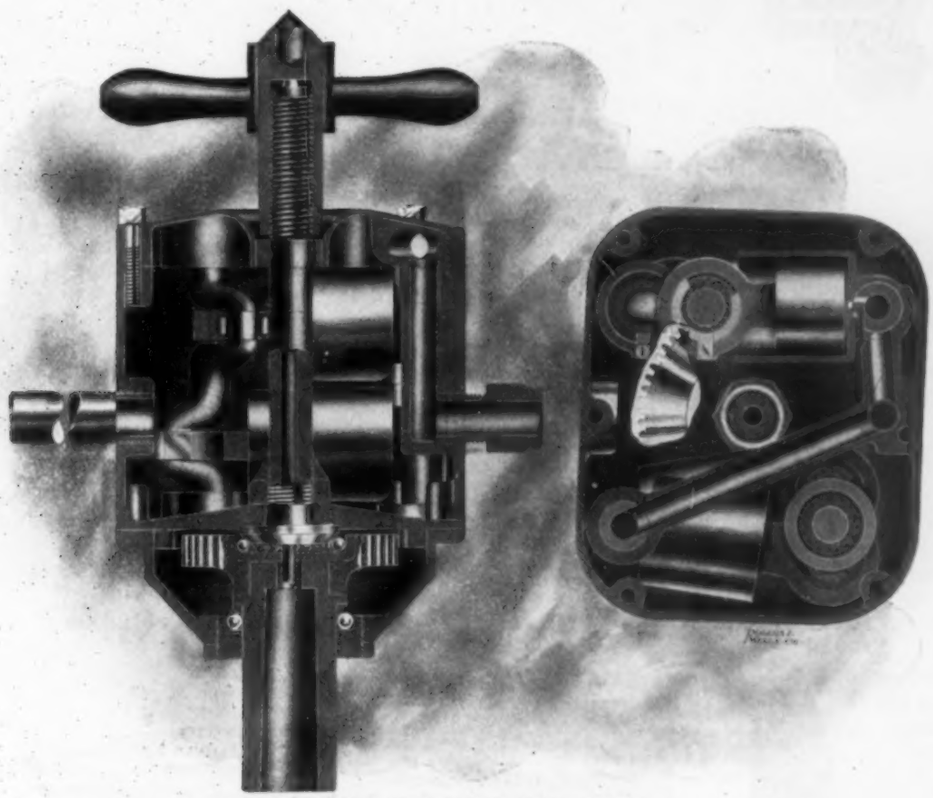


FIG. 1.—SECTIONAL VIEW OF PNEUMATIC DRILL.

The piston thrust is direct, and all the working parts are well protected. The drills are made both reversible and non-reversible, and in a number of sizes. The reversible drills run as powerfully in one direction as the other. Any one of this type of drills can be furnished with a loop or eye for suspension.

The riveting hammers as well as the calking and chipping hammers, shown respectively in Figs. 2 and 3, are the latest production of the company. They have but two moving parts, the plunger and the valve. The latter is known as the solid type. The hammers have an inner bushing in the barrel which may be drawn and replaced when worn. The handles are made by drop forging. The riveting hammers are made in four sizes with capacities from 7/8 to 1¼-inch rivets and can be furnished with 7 or 8-inch stroke. The above general description applies to the chipping hammers which in the four sizes weigh from 8½ to 11½ pounds.

TRADE PUBLICATIONS.

The 1904 catalogue of pneumatic apparatus made by the Curtis & Co. Mfg. Co., of St. Louis, has been sent from the office of Walter H. Foster, Liberty street, New York, and is an attractive as well as timely publication. The line includes air compressors, hoists, cranes, trolleys, etc. The illustrations deserve an especial word of commendation.

Catalogue No. 16 describes the improved pipe threading and cutting-off machinery, hand emery surfacers, roller cutters and the "Peerless" adjusting mechanism for expanding dies. The pamphlet is suitably bound for preservation and the Bignall & Keeler Mfg. Co., of Edwardsville, Ill., has included some pages of tables, etc., with the description of the machines.

The sixth edition of Ryerson's Technical Library No. 4 describes the Continental boiler with Morrison corrugated furnaces and gives useful information relating to boiler design and construction. The pamphlet comes from Joseph T. Ryerson & Son, of Chicago.

Cincinnati air and gas compressors are described in a pocket pamphlet just issued by the Laidlaw-Dunn-Gordon Co., of Liberty street, New York. These machines are of medium and small sizes, and one of the compressors is of an entirely new type in that the air cylinders are provided both with mechanically moved valves and with poppet valves, all points in the compression cycle being determined by the mechanically moved valves, with the exception of the opening of the exhaust, which is determined by the poppet valves.

The Logan Mfg. Co., of Phœnixville, Pa., has a folder detailing the manufacturing facilities at the foundry as well as the location advantages. The folder contains halftones of the works and a map.

The Joseph Dixon Crucible Co., of Jersey City, N. J., has a pamphlet entitled "Graphite Suggestion" discussing a few of the more important uses of the material.

The Buffalo Forge Co., of Buffalo, N. Y., presents two circulars treating of mechanical forced draft and the Buffalo steel pressure blowers. The first of these contains some discussion of mechanical versus forced draft

and the pamphlet on pressure blowers has tables of capacities, speeds, etc.

Circular No. 10 of the Hanna portable pneumatic shaker or foundry riddle, made by the Hanna Engineering Works of Chicago, illustrates the three styles of these machines. Halftones of the small tripod for air only and with an 18-inch round screen, the post machine for air or steam and the large tripod for air only and with 2-foot or 3-foot screens are shown.

A number of circulars present the claims of the Sterling hack saw blades made by the Diamond Saw & Stamping Co., of Buffalo, N. Y.

An interesting description of the new horizontal boring, drilling and milling machine manufactured by the Fosdick Machine Tool Co., of Cincinnati, is the subject matter of a neat pamphlet. The machine was recently described in *The Iron Trade Review* and is well worth a second reading.

"New Knowledge on Belt Management" was prepared for print by an enthusiast. Out of the money gathering motives he has preserved a good measure of art and his setting forth of the merit of Cling-Surface is done with skill and vigor. The Cling-Surface Mfg. Co., of Buffalo, N. Y., tells an advertising tale most enjoyably.

The second edition of the condensed general catalogue of the B. F. Sturtevant Co., Jamaica Plain, Mass., has gone to press. A few pages in this revised edition have been devoted to factory and industrial railway equipments, a new departure of this concern. The outgrowth of the success in equipping the new plant at Hyde Park, Mass., was the manufacture of this new line of products.

No. 69 of the Jeffrey Mfg. Co.'s series of catalogues deals with screening machinery and compares well with the preceding publications sent out by the firm at Columbus, O. Screens are made and a number illustrated for treating ore, rock, coal, clay and all sharp and gritty substances. Catalogue No. 52 is equally thorough in dealing with coal washing machinery.

Wm. Harris & Son, of Pittsburg, submits catalogue A of mine car hitchings and iron and steel forgings. The argument is sprightly and adorned with informing illustrations.

A supplement to catalogue No. 77 has just been issued by Arthur Koppel, manufacturer of narrow gauge railway materials, Broad street, New York, and has 11 pages and cover. The supplement gives some further data concerning standard track materials, mainly switches and turntables. These data will assist in making up plans for tracks in large buildings, factories, boiler rooms, etc. The supplement shows a few types of cars built since catalogue No. 77 was published.

A bulletin from the Commercial Electric Co., of Indianapolis, Ind., will be of service in the installation of a small but complete electric lighting plant.

Ladles is the topic of a circular from M. H. Treadwell & Co., of Liberty street, New York. A variety of ladles, cranes, and cars are compactly shown with dimensions, etc.

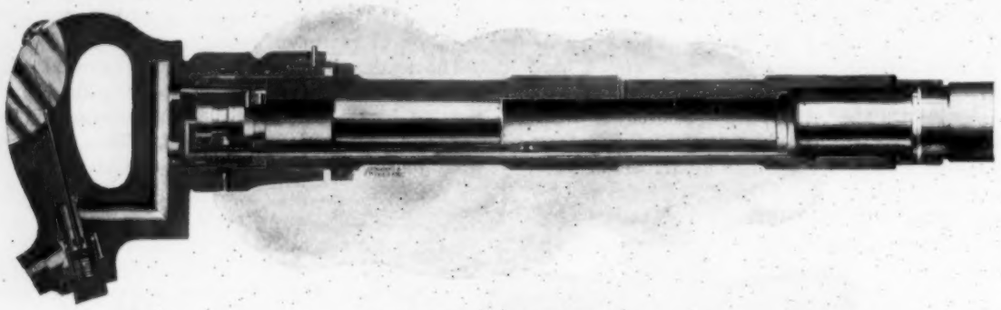


FIG. 2.—RIVETING HAMMER.

The Brown & Sharpe Mfg. Co., of Providence, R. I., has a price list of machinists' tools which is known as catalogue No. 105. This extends to 154 well indexed pages, 6 x 9-inch, and is a fitting companion to the indispensable general catalogue sent out by this firm.

Catalogue and Treatise No. 4 appertains to horizontal boring machines built by the Binsse Machine Co., of Newark, N. J. A number of operations not usually allotted to the horizontal boring machine are illustrated and with the other views will be valuable reading for the man in charge of production equipment.

Issue No. 23 is a clearly presented description of the lathes manufactured by the Bradford Machine Tool Co., of Cincinnati. The views of the machines are from exquisite halftones handled with the ample measure of success that produced the text.

The milling machines and milling cutters of the Hess Machine Co., of Philadelphia, have received some mention in the reading columns of *The Iron Trade Review* and are illustrated and described anew in a recent catalogue. The publication contains a guarantee of a roughing cut, in cast iron of ordinary character, of the following dimensions: 42 inches wide, ½-inch deep and 10 inches feed per minute.

The latest catalogue and price list of the tool holders manufactured by Armstrong Bros. Tool Co., of Chicago, is prefaced with some tool holder history. This recites the pioneer work of the firm and is followed with de-

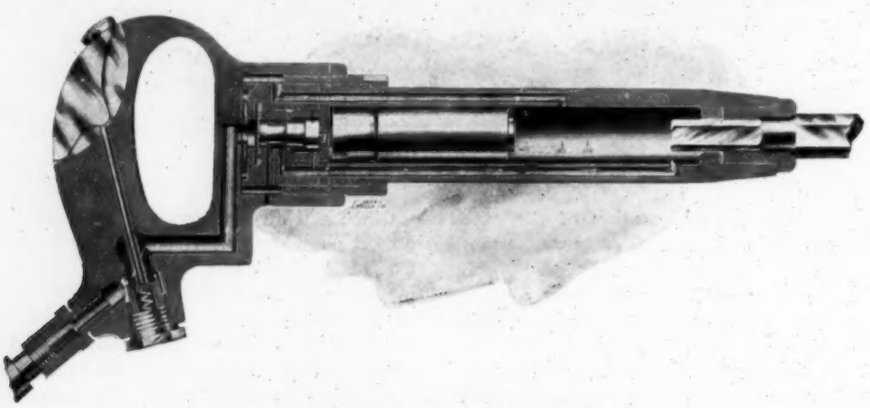


FIG. 3.—CHIPPING AND CALKING HAMMER.

scriptions of the line of equipment furnished. Tables of metric equivalents, decimals, etc., add to the shop worth and keeping qualities of the pamphlet.

No. 37 in the series of catalogues from the Newton Machine Tool Works, of Philadelphia, shows rotary planers of vertical and horizontal types with various forms of base, etc. Some of these have been described in *The Iron Trade Review* and all have points of interest.

A POCKET CALCULATOR.

Dr. Proell, the ingenious inventor of various devices—expansion gears for steam engines, spring governors, metallic stuffing boxes, etc.—has designed a pocket calculator which is being introduced by Hermann Kühne, Ltd., of London, Eng. The calculator is in two portions, each half about 4 x 6 inches, and both gridironed with graduations. One is printed on white cardboard and the other is on a transparent material resembling celluloid; the former is called "the card" and the latter "the film." The principle on which the calculator is constructed is similar to that of the ordinary slide rule, but the arrangement of the calculator, though small enough to be carried in the pocket, will give results with the accuracy of a slide rule over three feet long. The scale is printed on both the card and the film in equal lines, the only difference being that on the card the numbering commences at the top right hand corner and the reading is from left to right and downwards; on the film the numbering begins at the right hand bottom corner and reads from right to left and upwards.

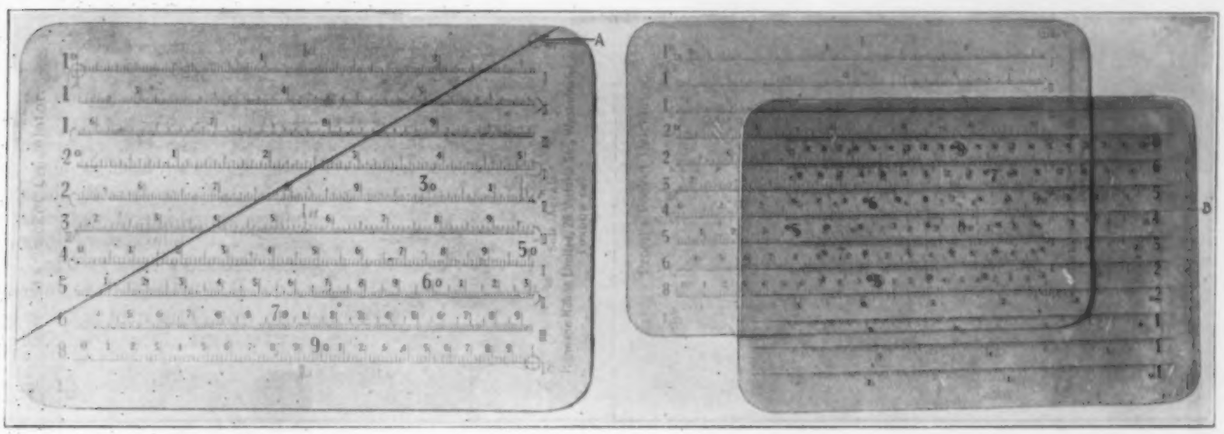


FIG. 1. FIG. 2.

THE PROELL CALCULATOR.

Fig. 1 illustrates the card in use for the determination of a square root, viz.: $\sqrt{1.5}$. This number lies on the second line of the card and when crossed by a straight line leading to a designated point will determine the root as shown by the engraving. A line, which may be any convenient ruler or a line drawn on the upper part of the film for this purpose, connects the point at A with 1.5 and will be seen to pass over the number 1.224 on the scale at the top of the series of horizontal lines of graduations. Various points are given in different parts of the card for numbers having more than one figure to the left of the decimal point.

Fig. 2 shows the method of multiplication. Here the card is underneath the film and the lines with the desired numbers are placed one over the other in order that the two coincide. Suppose that the numbers are 4.27 and 5. Along the line on the film indicated by B is 5 and under this graduation is 4.27 on the card. On the lower right hand portion of the card, as more clearly presented in the larger engraving in Fig. 1, is a small circle with two lines crossing at right angles. That point on the card enclosed by the area of the film lies directly under the answer to the product of the two numbers, in this case 21.35. The arrangement of the scales permits but one of the several points around the card to be enclosed for any particular product, hence there is no uncertainty. Other operations in division, etc., are performed in a similar manner.

THE FALLING OFF IN CAR ORDERS.

The statistics of the *Railway Age* on new car and locomotive operations in 1903 cover the orders actually placed in the twelvemonth and not the number of cars and locomotives turned out by the various car shops and locomotive works. We quote the following from that paper's comment on its figures:

"Whatever the cause, the totals of orders for freight car equipment placed in 1903 are but a trifle over one-half as great as those shown in corresponding statistics for 1901 and 1902. For purposes of comparison it is of interest to bring together the totals for the three years under the three heads into which our annual statement is subdivided. They are as follows:

	1901	1902	1903
Freight cars ordered	193,439	195,248	108,936
Passenger equipment ordered	2,879	3,549	2,310
Locomotives ordered	4,340	4,665	3,283

"It is desirable to say a word as to the character of the statistics presented. With orders on hand for many months in advance, which was the condition reported a year ago and two years ago by both locomotive and car builders, it is obvious that the number of cars or locomotives built during the year is not a criterion by which to measure the demands of the railways for new equipment. Roughly stated, 50 percent more freight cars have been built during 1903 than the number ordered during that period. This represents more or less closely the capacity of the car building establishments. Taking into account the orders left over from last year, it does not in any way represent the status of the railway companies during the present year with reference to additional equipment. For this reason the inquiries addressed to railway companies and to builders both of cars and locomotives have been confined to orders placed and not to equipment built and for which orders may have been placed 18 or 20 months ago. These orders may have been placed in anticipation of future needs. Their totals in any case do not deal with actual present realities.

"The explanations suggested for the falling off in orders seem to be strengthened in plausibility by a comparison of the figures relating to freight car equipment with those under the locomotive head. The number of locomotives is smaller but not in the same ratio as that in which the provision for freight car equipment has decreased. Passenger equipment need not be considered as subject to the same influences that control the other items, and for present purposes is negligible. The main point of interest is that the requirements in the way of motive power and freight equipment so conspicuously felt two years ago, less forcibly presented last year, have now been met to such an extent by the generous orders placed during these two years that it is entirely within reason that a halt should be called. As the congestion at certain terminals was felt sooner and more deeply in the matter of freight car equipment, the relief offered has been greatest in that direction, while the necessity for larger equipment of locomotives is in a measure relieved by the causes that have affected the entire situation."

WAGNER COLD SAW CUTTING-OFF MACHINE.

The illustration, Fig. 1, shows one size and style of the Wagner cold saw cutting-off machine. The Diamond Drill & Machine Co., Birdsboro, Pa., has secured the right to manufacture these machines in this country from designs furnished by the patentee. The machine shown is next to the smallest size and carries a blade 12 inches in diameter. The saw is mounted in an arbor carried in a swivel head at the front of the ram. This ram is square in section and travels in a long, rigid guide. The head is graduated and can be swung clear around in a vertical plane and clamped in any position, thus making it possible to cut off the stock at any desired angle. The arbor is driven by means of a phosphor-bronze worm wheel and steel worm, the wormshaft running longitudinally through the ram and carrying on its end tight and loose driving pulleys, thus requiring no countershaft.

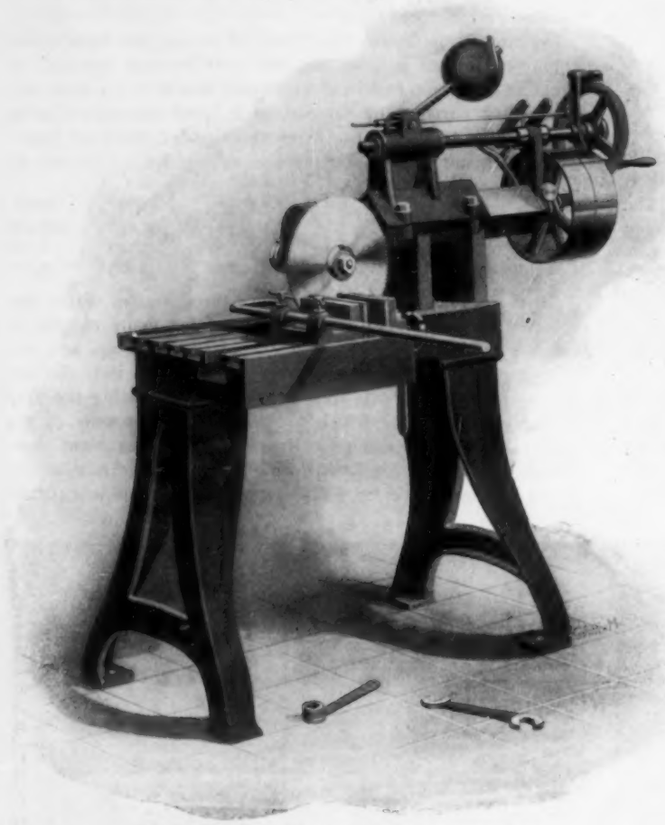


FIG. 1.—12 IN. COLD SAW CUTTING-OFF MACHINE.

The feed is positive and is obtained by means of an eccentric on the end of the wormshaft. The feed screw is journaled in a bracket at the end of the ram and runs through a nut which fits freely in a bracket cast on the top of the ram guide. The screw is rotated by a ratchet wheel and pawl. A rack is formed at the top of the feed nut, and meshing with this rack is a pinion, to which is attached an arm carrying an adjustable weight. This arrangement makes a very sensitive feed; it is easily regulated by shifting the weight and when the saw becomes dull and does not cut freely or the cross section increases, the weighted arm lifts, releases the feed and prevents the saw breaking or becoming jammed. A pan is formed in the table for lubricant, in which the saw constantly dips. The 12-inch saw will cut rounds up to 3½ inches in diameter; the largest machine, carrying a 40-inch blade, will cut rounds up to 13 inches in diameter. These machines are built with seven sizes of saw blades, and as many as four different styles of bedplates and vises with each style of saw blade. A special study has been made of designing different styles to meet the varying requirements to which this unique cold saw cutting machine can be put. The machine for cutting long I-beams, channels or heavy shafts is so arranged that it is not necessary to turn the work around when it is desired to cut off both ends. A heavier machine is illustrated in Fig. 2.

Another machine, Fig. 3, is designed for cutting off risers and sink-heads from steel castings. In this machine the table is adjustable vertically, and by setting the swivel head so that the saw arbor stands vertically, the difficulty heretofore experienced is overcome, as the casting can be set naturally or in the position in which it was cast with the sinkhead vertical.

Some of the advantages claimed for this machine are: Great capacity for speed, minimum wear of saw blade, automatic feed according to variation in shape or hardness of material to be cut. No cessation in cutting, even in case of saws with teeth broken out, etc. It is automatically thrown out of feed when the cut is completed, thus allowing one operator to have charge of several machines.

The company, which also makes steel castings and the Jackson belt-lacing machine, has recently made extensive improvements. A pattern storage house is just completed and a 25-ton regenerative furnace for the production of steel is also finished.

THE BRITISH IRON TRADE.

Reports from British iron and steel centers are rather more unfavorable. Demand for pig iron is said by some makers to be the lightest in years. Stocks in consumers' hands are small but they are waiting in expectation of lower prices. Makers' stocks have increased. A number of furnaces have banked recently and others are likely to follow, as restriction of output is considered far preferable to piling more iron. The Milton & Asham Hematite Iron Co., Ltd., in the Barrow-in-Furness district, until recently the largest maker in Great Britain of pig iron for the open market, has been compelled to restrict production from a rate of 260,000 tons a year to 5,000 tons a month. German competition is the principal reason. In the Barrow-in-Furness district, which is the principal center of production for hematite or Bessemer pig iron, stocks are growing and are now from 150,000 to 200,000 tons.

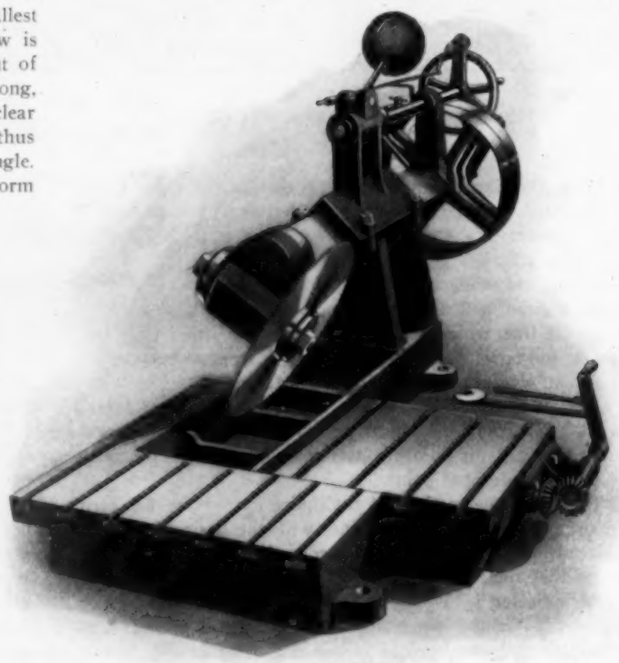


FIG. 2.—COMBINATION COLD SAW.

There are 24 furnaces in blast, as compared with 35 one year ago.

A Manchester market report of Dec. 18 says: "Continental makers of billets are, if anything, stiffening upon the low prices that were being taken a short time ago, and not only are they disinclined to accept further orders unless at some slight advane, but they are not at all eager sellers, even at slightly higher rates. American billets are still being offered on the market here, and also Canadian blooms, and American sheet bars. Delivered into this district German billets are still being quoted about £4 4s. for the large, and £4 5s. for the smaller sizes, but these are the minimum figures. American billets and sheet bars and Canadian blooms are obtainable at considerably under £4 per ton. English quotations remain without alteration but weak."

The London *Ironmonger* says: "The reports received regarding the offerings and sales of foreign semi-manufactured material agree in saying that consumers in many cases have covered their requirements for some little time, and that there is no disposition on the part of sellers to offer sales at cut-throat prices. Several thousand tons of American tinplate bars have, however, been done at prices considerably lower than those at which the initial business was reported to have been carried through. The reputed sales of 10,000 tons of American ingots to British works is now said to have fallen through. Certain Midland works appear to be leaving no stone unturned in an endeavor to wriggle out of receiving foreign material purchased at prices higher than those current today. It is regrettable that the hard things formerly said about American sellers should now be repeated in connection with British buyers.

"The disruption of the United States ferro-manganese 'pool' was due to increasing German competition. It appears that the American producers had to give seven days' notice of any intention to reduce their price, and this did not give them a chance to compete with the Germans who were sending stuff into the market. The result was that the Carnegie company seceded in order to have a free hand. It is said that there is no chance of American ferro-manganese being shipped to Europe yet awhile at any rate."

British Iron and Steel Statistics.

The production of pig iron in the United Kingdom in the first half of 1903 has been ascertained by the British Iron Trade Association to have amounted to 4,378,998 tons, which is an increase of 282,520 tons on the make for the corresponding period of 1902, and is at the rate of 8,757,996 tons for the twelve months.

The production of open-hearth steel in the United Kingdom in the first half of 1903 was 1,639,239 tons, against 1,710,602 tons in the first half of 1902, a decrease of 71,363 tons. Of the total production of open-hearth steel in the first half of 1903 the output of acid steel was 1,368,588 tons and that of basic steel was 270,651 tons.

The British Iron Trade Association has also ascertained that the output of Bessemer steel ingots in the United Kingdom in the first half of 1903 amounted to 911,670 tons, which compares with 888,378 tons in the corresponding six months of 1902. Of the total production in the first half of 1903 there were 360,634 tons of acid steel and 351,036 tons of basic steel, against 563,476 tons of acid and 324,902 tons of basic steel in the first half of 1902.

The pattern-making department of the Holly Mfg. Co.'s shops at Lockport, N. Y., has been moved to the plant of the Snow Steam Pump Works in Buffalo. The machinists, numbering about 200, are the only employes of the Holly plant now working at Lockport. It is expected that they will move to Buffalo in about four months, after a large contract on which they are now employed is completed.

The Standard Foundry Co., recently incorporated at Hartford, Conn., will have a capital of $10,000, divided into 100 shares. The officers of the company are: President, Allen C. Bill; secretary and treasurer, John W. Conway. The new company will open and operate the plant of the Carleton Foundry Co., Hartford. This plant, which is fully equipped with machinery, has been idle for about a year. Besides leasing the plant for three years, the new company has purchased outright the property of the Carleton company. The plant will be placed in operation Feb. 1. Mr. Conway has resigned his position with the Hartford Foundry corporation to accept this new position.

Railroad Building in 1902.

Returns of railroad construction for 1903 are not yet completed, but reports to the *Railway Age* show an aggregate of 5,723 miles of new main track laid. This is 175 miles more than shown in the preliminary statement for 1902 and 39 miles more than shown by the final statement for that year. These figures cover only first track and do not include the many miles of second track and siding built, nor do they take into consideration reconstruction work, which has probably involved the expenditure of more money than the new lines. The construction of the past year brings the total mileage in the United States up to 209,855 miles on Jan. 1, 1904.

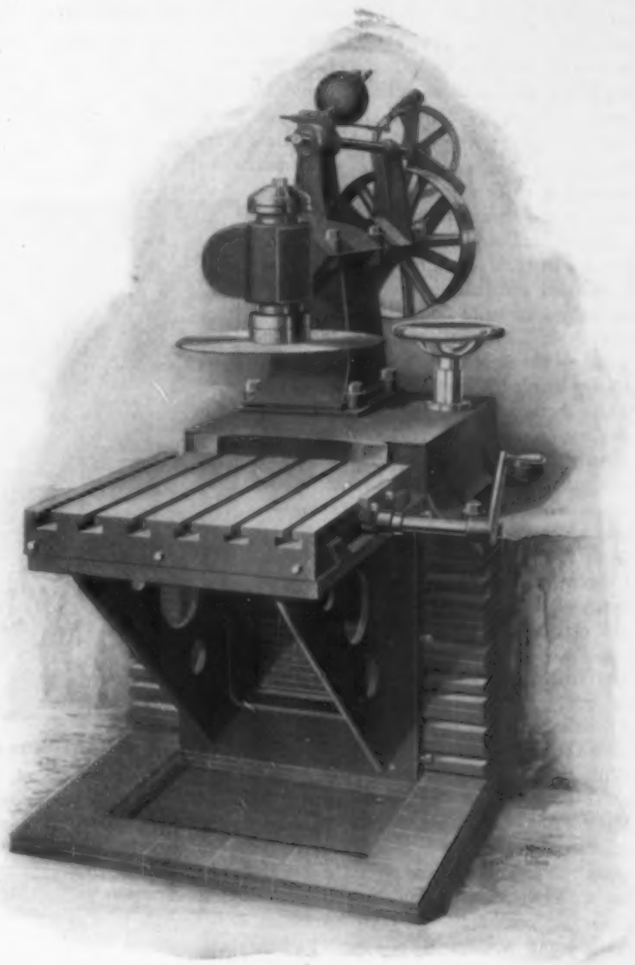


FIG. 3.—STEEL FOUNDRY COLD SAW.

Superintendent Howard Williams, of the Warren, O., plant of the Carnegie Steel Co., formerly the Warren department of the American Steel Hoop Co., has received word to lay off all men, including the office force, the number of employes being about 500. It is stated that if the mill is operated any more it will not be until after July. The citizens of Warren fear that the plant will be abandoned.

The new blast furnaces of the Alabama Steel & Wire Co., Gadsden, Ala., will be blown in this week.

THE LATE MALCOLM McDOWELL.

Major Malcolm McDowell, of Chicago, whose sudden death Christmas night was briefly mentioned in our issue of last week, had been identified with the metal manufacturing and mechanical arts of the United States for the past 50 years. The dissimilarity of the fields of operation in which Major McDowell engaged, embracing railroad appliances, agricultural machinery, iron and steel manufacture and metallurgy, compressed air, steam engines and machine tools, is illustrative of his versatile mind and his grasp of affairs. He was essentially a pioneer, anticipating the needs of the future and seeking to meet them. The later adoption of many of the ideas which he originated and advanced, made fame and fortune for those who put them into practice, as well as changed methods of manufacturing. He invented what is known as "semi-steel," and from the knowledge gained by his experiments in foundry practice, was one of the first and strongest advocates of the mixing of iron by chemical analysis, being a prolific writer on this subject in the technical journals and in papers before the various foundrymen's associations. In the midst of these multiplied duties, Major McDowell found time to co-operate enthusiastically with his daughter, Miss Mary E. McDowell, who is the head of social settlement work in Chicago, in seeking to brighten the lives of residents in the tenement and slum districts.

Major McDowell was born in Columbus, O., in 1828. As a boy, he worked in a railroad construction gang, and later on helped to build and operate the Columbus & Xenia railroad. In 1852, he became connected with the firm of Henry Burden & Sons, Troy, N. Y., and while there perfected the machinery for the manufacture of horse shoes, and shortly afterwards established the system of grading and numbering horse shoes which is in vogue today. This was accomplished with the assistance of Gen. Winfield Scott Hancock, at Fort Leavenworth, Kan., by turning thousands of horses into an immense smooth soft clay field, and from the averages of impressions gained, the sizes and numbers still in use were adopted. In 1860, he was with the Providence Tool Co., Providence, R. I., and closely associated with Corliss as well as with Albert and William Angell. The Civil War broke up this association, but after the fall of Appomattox, Major McDowell again turned himself to mechanics. In 1865, he built the first street railroads over the suspension bridges from Cincinnati to Covington, and over the Licking river from Covington to Newport, and also the street railways in Newport and Covington. Later, he worked for Guest & Atkinson, of Cincinnati, and while with this firm patented and made a spiral spring for use under passenger coaches and freight cars. About the same time, also, he built a car operated by compressed air and using a "roller bearing" on the axles, both of which have since come into general use.

MALCOLM M'DOWELL.

In 1870, he entered the employ of the Union Screw & Bolt Co., of Chicago, and the fundamental ideas employed in the manufacture of present day screw machinery are the result of his work while with this firm. Two years later, in association with others, Major McDowell built the Chicago Steel Works, and there used his patent slitting rolls, with which scrap rails and fag ends of rails were cut into three parts with one pass and rolled the parts down into material for making spiral springs. Shortly afterwards, he brought out his patent plow beam, which is in general use today. Its importance in the development and perfection of agricultural machinery may be gathered from the fact that at the World's Fair at Chicago, it was given the pinnacle location in the column of inventions marking the progress of agricultural machinery.

Shortly after bringing out his plow beam, Major McDowell patented a steel wheel for agricultural implements, and designed and built the machinery to manufacture them. His "hub and adjustment" was patented, as were also the "half-round, half-oval" spokes and reenforced tire. This enterprise was later taken to Plano, Ill., where Major McDowell formed the Plano Steel Works. The concern was not a success, however, though the inventor lived to see his wheel a success in other hands, as were also his all steel harrow and steel bull wheel.

In 1888, Major McDowell started a gray iron foundry at South Chicago, and brought out what he termed "semi-steel." He had been closely associated with Henry Rodman, the Government expert, some years back, in carrying on a series of experiments at the Rock Island arsenal, for the purpose of ascertaining the metal best suited to the manufacture of large guns. The experiments at that time culminated in the establishment of a standard for gun metal, which was "charcoal pig melted in an air furnace." He was successful in having semi-steel accepted by the Government for gun metal in lieu of hot-air furnace metal, an accomplishment in which he was assisted by the Farrell Foundry & Machine Co., Ansonia, Conn., at whose plant as well as at the Government arsenal at Watertown, Conn., the experiments and tests were conducted. Major McDowell demonstrated at that time that, unlike air furnace metal, as established by Mr. Rodman, his semi-steel did not deteriorate with the extreme strength demanded of them. Castings that had been rejected because the tensile strength was from 45,000 to 49,000 pounds per square inch, were accepted, and cupola practice was the gainer.

In the last years of his life, Major McDowell was interested in the development of a system for making wrought iron which he claimed had the simplicity of the Bessemer steel process. He also patented the "McDowell steel cross-tie," and the "McDowell rail-joint," as well as the machinery for their manufacture, and both devices have been passed upon favorably by railway men.

Major McDowell's war record is a brilliant one. He was on the staff of his brother, Major-General Irvin McDowell. He was placed in charge of Cincinnati by Gov. Tod and Gen. Lew Wallace, when that city was declared under martial law, and organized and commanded the body of 11,000 men, known as the "squirrel hunters" who enlisted for the defense of Cincinnati and Southern Ohio. It was about this time, that, without authority from the Government, Major McDowell borrowed $500,000 from his friends with which to pay off his troops, an act which won for him the praise of President Lincoln.

Stockholders of the United States Steel Co., of Everett, Mass., Dec. 30 petitioned the Middlesex Superior Court for an injunction to prevent the sale of stock and for the appointment of a receiver, on the ground that the concern is insolvent. The petition was filed by Adam M. Ross Jr. and Lydie Ariel Ross, who also allege mismanagement against President Charles S. Miller and other officers. The company is capitalized at $3,000,000 under West Virginia laws. The first steel was made Dec. 20, 1900. Annual capacity, 5,000 gross tons.

The Iron Sanitary Mfg. Co., of Chicago, recently incorporated, succeeds the concern of the same name which was almost entirely owned by James Wade. The business will be continued without change.

MOTOR-DRIVEN TOOL ROOM DRILL.

The tool room drill press is well adapted for operation by an individual motor, as it is practicable to mount the motor direct on the drill spindle, doing away with the belts, pulleys and countershafts otherwise necessary. The drill shown has been in use some little time and has been thoroughly tested in actual service. This machine consists of the well known Slate sensitive drill press in combination with an Emerson direct current motor. The motor has a special compound winding of a standard ¼-h. p. enclosed frame, and while requiring no more current than a 32-candlepower lamp when running free or with small drills, it has ample power for work within the range of the drill press. It is ruggedly constructed, well protected from dirt and chips, and will stand ordinary rough usage successfully.

SLATE DRILL WITH EMERSON ELECTRIC DRIVE.

Owing to the specially compound shunt and series field, this motor is connected direct from line to binding posts without starting box, being started and stopped from a small two-pole snap switch within convenient reach of the operator. The rush of starting current is cared for by the speed regulating coils of the motor itself, and the proportions of field are such that if the motor should be stopped entirely by a drill sticking in the work, or by the use of too large a drill, no damage to the motor would result. The motor will handle work up to the full capacity of the drill press, and in fact will drill cast iron with a 5/8-inch drill, although not recommended for such heavy use. The combination may be placed and operated in any place where 110 or 220-volt direct current is available, but it is not recommended for 500-volt circuits, as this pressure is too high for such a small motor, and the operator might be in some danger from possible grounds in the circuit. The drill press is manufactured by the Dwight Slate Machine Co., of Hartford, Conn., and the combination is supplied by the Emerson Electric Mfg. Co., of St. Louis, Mo.

As a result of the Kenton Hardware Mfg. Co., Kenton, O., being merged into the National Novelty Corporation, the Wing Mfg. Co., of Chicago, which is a part of this corporation, will be transferred to Kenton in conjunction with the hardware plant. This change will give employment to over 100 more men in Kenton and the capacity of the plant will be nearly doubled.

Views of Eastern Machinery and Machine Tool Makers.

NEW YORK OFFICE OF *The Iron Trade Review*,
Room 1920, 150 Nassau Street, January 4.

A number of machinery and machine tool firms, chiefly in New England, have responded to letters from *The Iron Trade Review* asking them to speak of the favorable features in the present situation. A good deal has been said in recent months of the change that has come over business. The object of the inquiry in this case was to discover the factors that offer resistance to the reaction from the prosperity of 1902 and early 1903. Some of the replies are given below, together with references to important developments of the past year:

Automatic Machine Co., Greenfield, Mass., manufacturer of automatic screw machines, etc.:

The most favorable symptom that we see in business is the stand which the iron people have taken regarding the price of raw material. With a well-defined feeling that raw material will not decline further, we believe that confidence will be re-established, and while we do not look for the heavy trade which we have had in the past two or three years, we believe that the coming year will see a healthy trade in the machinery line. As far as our own business is concerned, we have established ourselves in a new factory the past year, equipped with conveniences for handling material quickly and cheaply. We have established an automatic machine department and are in shape to handle anything in the automatic machine line which comes our way. We have brought out no distinctly new line of tools in the past year, but have improved the line which we have been building.

The Gleason Works, Rochester, N. Y., manufacturers of gear planers and gears:

The favorable feature of the outlook seems to be the amount of money on hand. Collections are as fast and as sure as any time the last nine years. Our particular business is about as good as ever because the demand for automobile gears is swelling to make up for those for other machinery tapering off.

Industry not Dependent on Speculation.

The D. E. Whiton Machine Co., New London, Conn., manufacturer of centering machines, lathe and drill chucks and gear cutting machines:

It is difficult for us to form any general estimate regarding the prospects for 1904, but it is our opinion that we may reasonably expect a large volume of business. We infer that a great many air castles have been so badly shaken during the past year that their builders will think it worth while to keep a little nearer to the solid foundations for a time. We shall not be surprised if this turns out to mean a closer attention to regular business during the coming year and consequent continued activity along the sound and conservative lines, in order to retrieve some of the losses. In other words, some of the accumulated surplus has been "blown" and a period of "steady habits" will ensue.

Business which has depended upon the blowing process will probably continue dull, and to some extent industry will be affected; but in general this speculative process depends more upon the profits of industry than industry does upon speculation. Our December shipments were fully up to the average, and we are carrying a large lot of orders into the new year, besides a badly broken stock. We also contemplate a considerable expenditure during the year for increased facilities, so, as far as we are concerned, the report must be very favorable as to the prospects for 1904.

Becker-Brainard Milling Machine Co., Hyde Park, Mass., manufacturer of milling machines:

There has been a pretty general falling off in the machinery and machine tool trades during the past two or three months, although we have been fortunate in securing a fair amount of orders. In regard to the outlook for the coming year, we see no reason why we should not have a very favorable year as a whole, and although we have the Presidential election coming, we think this will make but small difference.

in view of the fact that the condition of the country is prosperous and crops through the West have been exceedingly good. Also with the many plants readjusting themselves to new conditions, with lower wages and lower priced material, we see no reason why the prospects should not be good for a fair business the coming year.

We have brought out several new machines this last year, including the 26-inch planer type, which we believe you have already described, also improvements in our new model machines. We are continually adding to our equipment.

Ferracute Machine Co., Bridgeton, N. J., manufacturer of presses, dies and other sheet metal tools:

We are not very well able to judge about the present machinery market, or its future prospects, as we have been in bad confusion on account of our fire, which occurred Sept. 27. We are working over half of our force in two temporary shops, one of them running nights. We seem to have the usual number of inquiries and as many orders as we can handle. We, therefore, judge that business in our special line of work, which consists of presses and dies for sheet and bar metals, is as good as it has been for several months past, but not as lively as it was a year or two ago.

The prospect ahead to us seems good, and we see no reason why business should not increase somewhat during the coming spring. Under our present circumstances we have not been able to bring out anything new recently.

Last Year Exceeded 1902.

The Pratt & Whitney Co., manufacturer of machine tools, Hartford, Conn.:

So far as our volume of business goes compared with that of 1902, we have booked for the past twelve months orders in excess of the preceding year by some 10 percent, which we consider reasonably gratifying in view of what we hear of the dearth of orders with other people. We attribute this to the fact that we have put in the market within the last year specially attractive machines in the line of thread millers, turret lathes, special features and attachments for engine lathes and tool room lathes, a complete newly designed bench lathe and its equipment, giving facilities that we regret to say the larger manufacturers do not seem to appreciate, while others are gradually learning the great value of this machine in the tool room.

It is only a few years ago that this company introduced the first bench lathe, and it was found so extremely satisfactory and convenient for a great variety of the small work which all machine shops require to do, whether they are building large machines or small machines, that we have since installed them one after the other until we have 40 now scattered about the different departments. We would not know what to do without them, and think our experience would be to a greater or less extent duplicated by most machine works if they would introduce them and with men that are familiar with bench machinery, until they become acquainted with it and get the advantages of its merits.

Special lines of milling machines and profiles also have attracted attention. Our business on these lines has been fully double our average business, these machines being used where they were hitherto not considered adapted. Our new form of profiler is being used for a vast variety of work where trimming of edges, either vertical or horizontal, to the bed of the machine is done more quickly than by any other machine that we are familiar with. It has become in this sense a hand surface milling machine, the drive which we have adopted enabling us to revolve the spindles up to a maximum speed of 1,600 revolutions per minute, so that a small cutter can be used to advantage and small corners followed up so that the nearest product can be made.

We have under consideration the development of machines which we think will be particularly attractive to our customers, but we do not care to go into details in regard to these things until we have them pretty well advanced; in fact about ready to place upon the market. In all it is the accepted policy of this company to keep in the van in everything that we make, not only as to the design by which the largest product can be turned out, but product of the very highest character.

R. E. Kidder, Worcester, Mass., manufacturer of sawing machines, drawing tables and special machinery:

I am not, perhaps, what people in the trade call a tool builder, as I don't build engine lathes and planers, but special machinery to a great extent, although I have a line of saw benches of my own that I build and other machinery. I have been quite busy in the machine shop the past year and the outlook I think is fairly good.

Flather & Co., Inc., Nashua, N. H., manufacturer of machine tools:

Up to this writing our firm has felt the depression in business but little. As to next year, we do not know what to say. We think there will be a moderate trade and something doing all the time, but not as much as the first half of 1903. Our reason for thinking so is that the prices of iron and other material are now quite steady and probably will not go much lower; also, the prices of finished machinery are firm. There has been no panic or extensive shutting down of works such as there was in 1873 and 1893; therefore it looks to the writer as if after a few months of dullness we shall have a fair amount of trade again.

Widely Varying Conditions in Different Lines.

Blake & Johnson, Waterbury, Conn., manufacturers of special automatic machines for working wire and sheet metal:

We are builders of special machinery of various kinds and we are pleased to state that we have received fully as many inquiries for prices and delivery of our machinery during the past few months as we have during the past few years, and in fact we believe we are receiving more. Other machinery builders in Waterbury are complaining of lack of orders and lack of inquiries, but we have no complaint to offer in any way. We also find our other line of business—the manufacture of special rivets, screws, pins, studs, etc., to order—is better than we usually look for at this time of the year, and have seen no great dropping off in this line.

Only a few moments ago we were talking to an old steel salesman, who stated that he found in this section of New England a very peculiar condition—a great dropping off of business and lack of orders with many concerns, and that they were only buying for immediate requirements, while their next door neighbors were overrun with orders, their works being operated at night, and they were placing orders for steel as freely as ever.

We have no special developments in our own business to report, except that we are continually re-designing all of our machinery, and during the past year have probably made greater strides in the matter of new designs than ever before. In our particular line we find that it is absolutely necessary for us to make every single machine which leaves our doors of a more modern design than the last, if possible, and this seems to be required, not only as regards the actual working parts, but the general appearance of the machines.

We have nothing new to report in the matter of plant or equipment, except that we have discarded probably 75 percent of our old machine tools during the past year and have replaced them with the most improved and heaviest machine tools of the various kinds which we could find. We have also endeavored to replace our old machinery with the very best tools which we could purchase, regardless of price, as we consider this the best policy when installing any machinery, and we believe the same statement applies to the machinery which we build, for our first thought is to make our machinery as good as we can possibly build, and then endeavor to get the cost within reason, considering the quality of the machinery.

Whitcomb Mfg. Co., Worcester, Mass., builder of machine tools:

In our opinion the outlook for business is better at the present time than it has been for a month or two. Some few orders appear and although these are not sufficient to enable us to call business good, we consider them hopeful signs and are encouraged by them to look for a fairly good business next year. The recent stiffening of prices of pig iron will

probably have a very good effect in steadying business and besides the actual dropping of business seems to have stopped and it will not take much to bring back good conditions again.

During the past year we have increased our capacity quite a little and have completed and perfected our new line of second belt drive planers which are giving excellent satisfaction wherever we have sent them.

Norton Emery Wheel Co., Worcester, Mass.:

Referring particularly to our emery wheel business, we can say that prospects are satisfactory and encouraging. Up to the present time we have not noticed a falling off in orders or general correspondence. We have had a splendid year, the best we ever had, our sales of wheels in every month but two having increased from 20 to 25 percent over those of last year, which up to that time was our best year. We notice a satisfactory increase in our foreign trade. The circumstances warrant us in thinking that the coming year will be a good one.

J. G. Blount & Co., Everett, Mass., manufacturers of metal working machinery:

There has been considerable falling off in our business for the past three months, although the year taken as a whole has been the most prosperous one we have ever had. We were fortunate enough to secure considerable business during the month of July, which has kept us very busy up to the present time. We are expecting that business will be dull for a month or two, but shall use this time to bring out some new machines which we wish to add to our line, having not had the time to do so before. We have made considerable additions to our plant for the past year; have installed a 60-h. p. Corliss engine and have added several new tools. We have also built an addition, to be used for assembling purposes.

No Serious Depression Ahead.

The Beaman & Smith Co., Providence, R. I., manufacturer of boring and milling machines and other tools:

We judge of the future from our experience of the past, and from it we do not look for an immediate improvement in business. But we do not believe there will be such a period of depression as has occurred in the past at intervals of about 10 years, for the reason that manufacturers in all lines of industry are conducting business to a greater extent than ever before on their own means, and not on borrowed capital. Consequently confidence is more quickly restored; stocks and supplies are not completely exhausted before replenished, making demands more uniform and so-termed booms less probable and pronounced.

Builders Iron Foundry, Providence, R. I., founders and machinists:

We think that in time the excellent crops throughout the country will favorably affect the machine tool and taking the year as a whole we have no serious cause for complaint, as our sales in 1903 were ahead of the previous year.

Stockbridge Machine Co., Worcester, Mass., manufacturer of shapers:

The outlook for the new year seems to us to present many favorable features. At present we are running overtime and are quite a little behind on our orders. Our inquiries come from all over the country, no one location in particular, but there seems to us to be a general picking up in business from the iron trade. We have recently filled an order for 25 motor-driven 24-inch shapers for the Navy Department, and this machine seems to be a general favorite. While our home trade has not been for the past four or five months quite up to the first of the year 1903, export trade has shown a very material increase. We are very well pleased with the outlook for the next six months.

The Billings & Spencer Co., Hartford, Conn., manufacturer of machinists' tools and drop forgings, sends us a newspaper interview with one of its officers. Its substance follows:

The year 1903 has been the best in the history of the company. Its auto forging work is now receiving special attention, and increasing. Its drop hammers go direct to the manufacturers, and its small tools to the hardware dealers and thence to the tool dealers. The product goes principally to the markets in this country, England, France and Germany. The company employs 260 hands. An important improvement is being made at the plant. Fifty furnaces are being remodeled, so that fuel oil, instead of coal, will be burned in them in future. Storage tanks, which have a capacity of 21,000 gallons, or three carloads, are being put in, and a pipe line will connect the factory with the railroad. More than 1,000 gallons of Pennsylvania fuel oil will be burned daily. The company anticipates a prosperous business in 1904.

High Speed Steels not Taken into Consideration.

Coes Wrench Co., Worcester, Mass., manufacturer of wrenches:

We consider the prophecies of slack business for 1904, by the machine tool men, due to overproduction of machine tools and the fact that the new high-speed steels have not been taken into consideration in making up stock machinery. The machines in many cases which were suitable a year ago and considered heavy enough for the work are now too light and entirely out of the running as regards sales. We do not think that there will be any great difference between the coming season and 1903 as regards quantity of business done, and while, of course, our business is always slack during December, we see favorable signs from every section of probable purchasers for the coming season. Contracts are being given us and every indication points to a reversal of the opinion given by outside parties as to slack business in the metal trades. There is a slight money stringency in the East which does not appear in Western payments. We consider the business now being done unusually satisfactory for December.

The Skinner Chuck Co., New Britain, Conn.:

Business in the machinery and machine tool trades fell off in this vicinity in the early autumn, but during December there was an increase of orders and inquiries and the outlook for the coming year is considered favorable. There has been less interference in business by labor troubles for the last few months and the consensus of opinion among those best informed is that there is generally a better understanding and agreement between employers and employes. The Skinner Chuck Co. has recently doubled the capacity of its plant, added largely to its machinery and its facilities for producing chucks. It is extending its business to all parts of this country, and is finding a market for its goods in Europe and the East.

Francis Reed Co., Worcester, Mass., manufacturer of drills, nut tapers and planer chucks:

The panicky feeling in the financial world and the bad labor situation which may and will probably extend into the influence of a Presidential election, are the unfavorable features. But the favorable feature is that business is as good as it is under the above conditions.

The Armstrong Mfg. Co., Bridgeport, Conn., manufacturer of water, gas and steam fitters' tools:

We have not noticed any very large falling off in business in the last year, but have noticed that collections are not quite as prompt as they have been. We have not added any new lines during the past year.

The Hendey Machine Co., Torrington, Conn., manufacturer of machine tools:

We have nothing new to report regarding prospects for business during the coming year. We have been fairly busy up to this time, and as we are receiving a large number of inquiries, we anticipate business will show some improvement by Feb. 1.

Prentice Bros. Co., Worcester, Mass., builder of drilling machines and engine lathes:

Trade has been rather dull with us for the past few months. We can offer really nothing as to the future. In-

quiry seems to be quite good and we have more or less assurance from the dealers (our agents) that business is to be better after the new year. We hope so.

Some Falling off to be Expected.

The Eaton, Cole & Burnham Co., New York, manufacturer of pipe machines and tools:

It may be said to be true that the machinery and machine tool trades have shown some little falling off in the latter months of 1903. The cause may be due to a considerable degree of uncertainty as to the outlook, and this uncertainty not unlikely has its basis in the varying reports and uncertain condition of the great steel trust. We should say, however, that at this time of year, and especially when prices have been higher, some falling off in the demand for goods is to be expected. So far as our own machines are concerned, we have recently reduced our prices from 8 to 10 percent, this being due to the reduced cost of material, and it is to us a pretty well-established fact that whatever the reason or whatever lack of reason there may be for reducing prices, there is likely to be engendered a feeling on the part of purchasers that there is likely to be another reduction, and this only serves to make that phase of feeling somewhat more pronounced.

We may say, however, we have excellent expectation for the incoming year. We are inclined to think that many enterprises which have been held up during the past year, by reason of labor troubles, will be started again in the early part of 1904, and that the requirement for getting buildings completed and finished will help very largely to restore business to what may be called its normal conditions.

J. E. Snyder, Worcester, Mass., manufacturer of vertical drilling machinery:

Notwithstanding the falling off in the machine tool trade the past three months, we have been fortunate in disposing of nearly all of our output. We consider the future prospect very good, and fail to see any signs of any long depression. We have added about $4,000 worth of new machinery the past year, consisting of Putnam 60-inch gap lathe, Van Norman universal milling machines, Reed lathes, and other smaller tools. We look for an improvement in business in about six weeks. Foreign business is looking better.

Woodward & Powell Planer Co., Worcester, Mass., builder of metal planing machines:

In replying to your letter, we cannot make a very favorable report. We have not brought out any new tools in the past year, neither have we added to our plant. About six weeks ago we were fortunate in securing two large orders; that is, they were large for this concern, which will keep us busy all winter. We find that the general trade is dull, very dull, and has been dull since last June. As to the prospects for business in the future, we do not see any very encouraging signs. At the present time there is a little more activity than there was one or two months ago, but it is so slight that we dare not take much encouragement.

Chief Falling off in Lathes.

Hill, Clarke & Co., Boston, dealers in machinery:

We think general business has dropped off very much during the past six months in the machinery line. We are still getting a fair amount of orders for special machines and some orders from old customers who are making improvements in their works. We think there is more falling off in the demand for lathes than for any other line of machine tools. Trade in planers, shapers, milling machines, and screw machines continues to be fairly satisfactory and we are also getting a great deal of business in pattern-making machinery.

We have been very fortunate in placing the product of the Chicago Machine Tool Co., which is manufacturing a new line of speed lathes and grinders, and a very valuable line of hand millers. The latter have met with very ready sale so that we have not as yet been able to keep up with the orders and today have absolutely none in stock. Milwaukee milling machines, manufactured by Kearney & Trecker, of Milwaukee, are also selling rapidly so that the factory will not be able to give us even a complete line of samples until next March. We think there is going to be a fair amount of business in 1904, but it is going to be a year that will test the intrinsic merits of the different machine tools. We think that all the manufacturers of high grade tools will have a fairly satisfactory amount of business.

Goddard Machine Co., Holyoke, Mass., manufacturer of engine lathes:

The amount of new business prospectively in sight makes the outlook for 1904 a good one. There is a general feeling that the year's business will be satisfactory in all lines. This of itself will tend to make it so. There are no special developments in our business to report.

Baush Machine Tool Co., Springfield, Mass., manufacturer of radial drills and boring and turning mills:

Business with us has been quite dull the past month. The business outlook for the beginning of the coming year looks somewhat better. We have not made any addition to our plant in the past year. We have, however, added several new tools to our equipment. We have recently brought out a new line of high speed multiple spindle drills, and have made many improvements on our radial drills and boring and turning mills, adapting them to the use of high speed tool steels.

The Coulter & McKenzie Machine Co., Bridgeport, Conn.:

The only contract of importance we received in December was for a set of car spring machinery for Western Australian Government. We have a number of unfinished orders for special machines that will keep us busy for some time to come. Several good sized orders are being held up at this season, owing to inventory and annual meetings and will no doubt materialize within the next month or so. We are well satisfied with present prospects, and as soon as new values are established, and more confidence between employers and workmen, the business will be satisfactory. It is apparent to the trade generally that we could not continue to increase our production at the rate we have been going, for any great length of time.

American Sheet and Tin Plate Co.

The official anouncement of details of the merger of the American Sheet Steel Co. and the American Tin Plate Co. is as follows:

"The business of the American Sheet Steel Co. and American Tin Plate Co. will hereafter be conducted under the name of American Sheet & Tin Plate Co., with the following organization: George G. McMurtry, chairman of the board of directors; W. T. Graham, president; W. M. Leeds, first vice president; E. W. Pargny, second vice president and manager of sales; W. P. Beaver, assistant to president; John Warner, assistant to first vice president; Howard M. Davis, assistant manager of sales; H. B. Wheeler, secretary and treasurer; H. L. Austin, auditor; G. M. McGinnis, assistant auditor; C. W. Bray, chief engineer, Pittsburg; R. A. McKinney, purchasing agent, Pittsburg.

"The general offices of the company will be moved from Battery Park building, New York, to Pittsbury early in 1904; but until further notice officers as above can be addressed at New York, with the exception of Mr. Bray and Mr. McKinney. The following district sales agents have been appointed; Frank Dickerson, Battery Park building, New York; W. H. Eaton, Marquette building, Chicago; W. J. Wetstein, St. Louis, Mo.; I. B. Williams, San Francisco, Cal.; Richard R. Hoge, Portland, Ore.; E. W. Sparhawk, Denver, Col.; J. R. Scott, New Orleans, La.; W. T. Shannon, Cincinnati. The Detroit sales office has been discontinued. The Pittsburg sales office will be merged with the general sales office when the offices are moved."

AN ELECTRICALLY-DRIVEN MILLING MACHINE.

The illustrations show a very satisfactory solution of difficulties met in the design of a direct motor drive on a milling machine. This problem is quite complex because of the peculiar service to which milling machines are put. The principal points to be considered in the design of such an arrangement are: 1. The wide range and great number of speeds that are now a necessity for economical milling. 2. The power consumed, requiring a motor that is very large as compared to the size of the machine. 3. The machine must be started and stopped many times a day. These conditions have been provided by a No. 4 plain miller with motor drive recently brought out by the Cincinnati Milling Machine Co. This tool is the result of four years' study of the problem of electric driving as applied to millers.

The design is based on the conclusion that the only satisfactory arrangement of a direct connected electric drive for machine tools is obtained by the use of some type of variable speed motor, and in this particular case the builders strongly advocate the use of a shunt wound direct current motor operated by a field rheostat. The variation in speeds being obtained from the motor, obviates the use of the usual gearing; and the field rheostat has the advantage that when once set to give the desired speed for a particular job, it need not

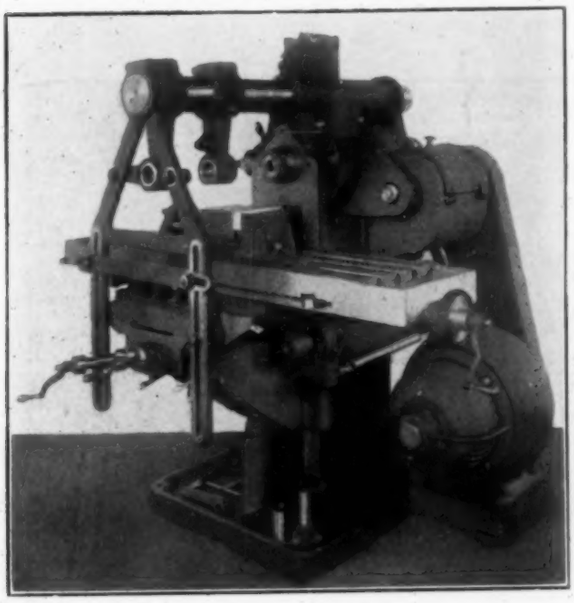


FIG. 1.—MILLING MACHINE WITH VARIABLE SPEED MOTOR.

be disturbed when starting the machine or motor, and thus eliminates the trouble that arises from setting the lever to the wrong notch, as so often happens when the street car type of controller is used.

Reference to Fig. 1 shows the manner in which the motor is mounted on an extension which is cast to the base of the machine. This brings it near the floor, adding to the stability of the machine; and the entire arrangement being at the rear occupies space which would not be available for other purposes because it must be kept free to accommodate the table travel.

Any one of several well known makes of motor can be used providing it is shunt wound for a speed variation of 2½ to 1. This is multiplied by the double back gears, giving at the spindle a range of speeds for cutters 5-16 to 6 inches diameter at a surface speed of 20 feet per minute, and for cutters from ⅝ to 12 inches diameter at a surface speed of 40 feet per minute, which is suitable for milling cast iron. It is clear enough that these machines fitted with shunt wound motors are thoroughly adapted for installation in shops employing the multiple voltage system, in which case they will use only one of the several voltages available, thereby simplifying the wiring and controlling apparatus.

Power is transmitted from the motor to a friction clutch, and from thence to the spindle by Morse silent chains. This interposition of the friction clutch between the motor and spindle, is one of the novel features of the design. By means of it the machine may be started and stopped quickly without stopping the motor, thereby saving that considerable amount of time that would otherwise be lost in waiting for the motor to come to a stop, and when starting, in waiting for the motor to come up to speed. This is an item that is usually overlooked. It amounts to a great deal as compared to the cost of running the motor alone while the machine is making short stops for

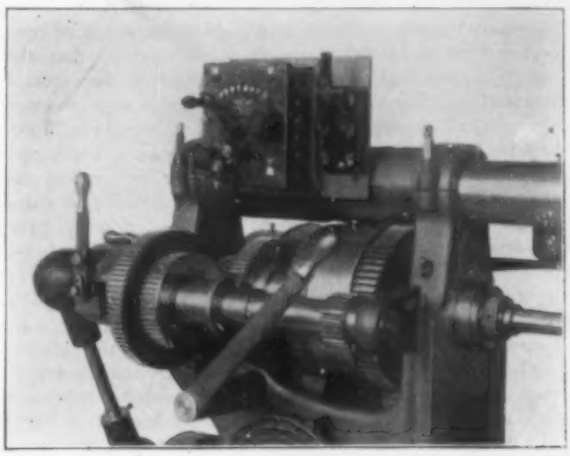


FIG. 2.—ARRANGEMENT OF DOUBLE BACK GEARS.

chucking work. The motor can, of course, be stopped at any time by cutting off the current in the usual way. The automatic release starting box, field rheostat, friction clutch lever, back gear lever, double back gear, as well as all feed-changing and adjusting levers at the front of the machine are within easy reach of the operator, who need never go to rear of machine except for oiling.

Fig. 2 shows the arrangement of the double back gears. The details of the construction are shown in Fig. 3. The chain from the motor drives the wheel A, which transmits power through shaft B, chain and chain wheels C and D to the spindle E. The back gears F and H are both keyed into a sleeve I,

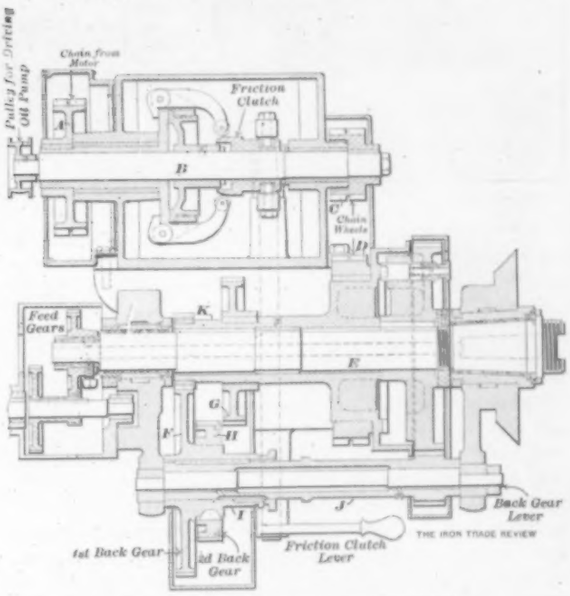


FIG. 3.—DETAILS OF DRIVING MECHANISM.

which slides on the back gear quill J, and when used in the position shown in illustration, gear A is driven by the small gear on the main driving quill K, giving the first series or slow back gear speeds. When it is desired to use the second back gears, the gears are thrown out of mesh in the usual way, the sleeve is moved along the back gear quill to bring H and G in line, and then the gears are again thrown in. The gear H is provided with a flange, so that there is no possibility of this

gear sliding into mesh with G when the other pair are in mesh. The friction clutch lever gives the operator a complete control of the spindle and is also convenient for making a partial revolution of the spindle, the advantage of which is at once evident.

This machine is built by the Cincinnati Milling Machine Co. and any of the back geared machines of this make can be supplied with the arrangement.

HIGH POWER PARSONS STEAM TURBINE

The past three years have been marked by no more conspicuous event in American industrial development than the commercial introduction of the steam turbine for general power service. The Westinghouse-Parsons steam turbine was commercially introduced during the closing months of 1900. The sizes then built were of 600 h. p. nominal capacity, direct connected to 400-k. w. polyphase generators. Subsequent development has been so rapid that within a period of four years turbines of 5,500 k. w., or 7,500 h. p. nominal capacity, have been designed and are under construction. These machines will have a continuous overload capacity of 11,000 h. p. in one self-contained unit, and thus rank among the world's largest prime movers.

Recently marine work has been contemplated by the builders and the near future may be productive of turbines of still greater power although of slightly different arrangement, necessary to adapt the present type to marine usage.

The 5,000-k. w. turbo-generating unit illustrated, Fig. 1, is representative of the general type for large powers. The principle of rotating as well as the general relation and arrangement of rotating and stationary elements characteristic of former types has been employed. The most distinguished features of the new type are the extreme compactness and low speed secured. These features have been practically prescribed by the necessity of minimizing the cost of power building construction for larger station capacities.

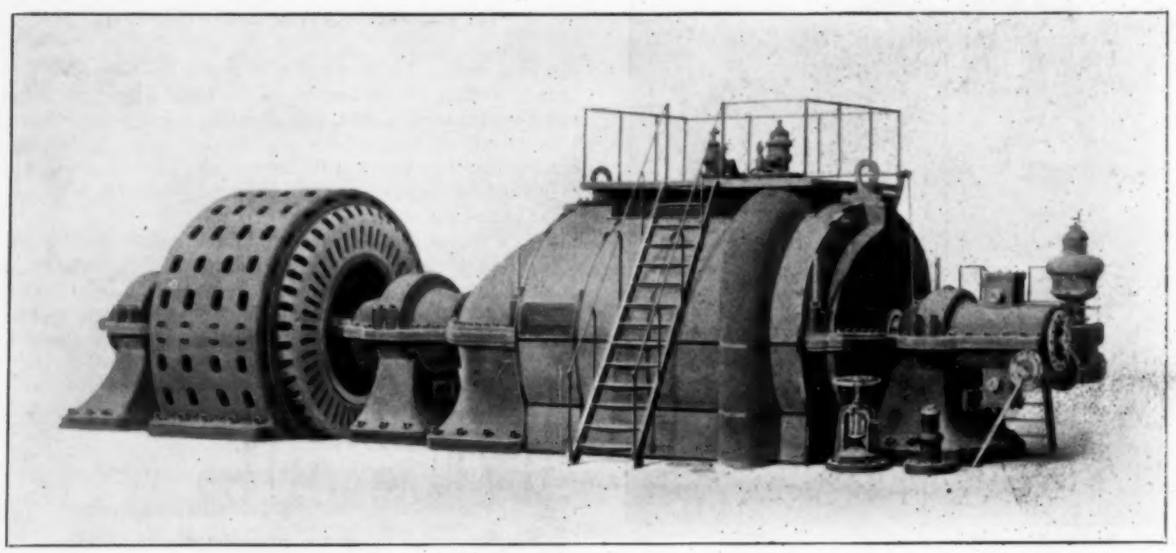


FIG. 1.—THE 5,000-K. W. TURBO-GENERATING UNIT.

The space occupied by the 7,500-h. p. turbine is approximately 27 feet 8 inches by 13 feet 3 inches, and the height to the top of the hand railing is 12 feet. This is equivalent to .049 square feet (less than 1-20 square foot) per electric horsepower capacity, or 20.2 h. p. per square foot of floor area required.

For the complete unit a rectangular area of 47 feet 4 inches in length and 13 feet in width is required, which is equivalent to .084 square foot per e. h. p. capacity, or 12 e. h. p. per square foot of floor space.

A graphical comparison of floor space required for different types of prime movers is shown in the accompanying curves, Fig. 2. In all cases a complete unit is taken as the basis of comparison. In point of speed, the new type fulfils the demand for a unit operating at moderate speed. The 5,000-k. w. units operate at 750 r. p. m., the 2,000-k. w. unit 1,200-1,560 r. p. m., and the 1,000-k. w. unit 1,500-1,800 r. p. m., depending upon the frequency desired.

The accompanying elevation of the 5,000-k. w. unit, Fig. 3, shows the general arrangement of the main cylinder body, bearings and auxiliary parts. The unit rests upon a single bedplate cast in two sections which are secured by shrunk links. To the bedplate, which is heavily ribbed to secure rigidity, are bolted the pedestals, generator casing and turbine body, but the bedplate itself is not secured to the foundation by other means than the weight of the unit. Steam and exhaust connections are made beneath the floor level.

In the smaller machines of this type, the cylinder barrel and both journals are cast in a single casting, thus largely minimizing machine work. In the large machine, however, the barrel is cast in two sections united by links, the outboard section carrying the journal and worm casing, and the inboard section the journal and exhaust opening which extends through the bedplate. As in former types linear expansion and contraction of the turbine are provided for by a sliding foot. The inboard journal pedestal is bolted securely to the bedplate but the outboard pedestal is free to slide between parallel machined ways. The main body of the casing is heavily lagged with non-conducting material, secured in place by sheet steel casings.

Leakage of air from the atmosphere into the exhaust spaces of the casing at the entrances of the shaft is prevented by frictionless packing glands. No oil is employed and in consequence the condensation from the turbines is pure distilled water.

In shaft construction there is great rigidity with minimum use of metal. A central steel quill carries the entire rotating parts, both blades and balance pistons. Hollow forged steel ends are forced into the two ends of this quill, under hydraulic pressure, and are in addition secured by arrowhead links. High pressure steam is conveyed to all parts of this quill structure in such a manner as to eliminate stresses and consequent distortion due to highly superheated steam.

Power is transmitted to the generator shaft through a flexible coupling which is housed partly by the turbine and partly by the generator inboard journal. The coupling is split at the junction of the two shafts, so that by removing one bearing cap and the coupling bolts either section of the unit may be lifted out without disturbing the adjustment of the remaining section. The journals in the larger machines are of the solid self-aligning type, similar to that employed in generators and cross-compound engines. The departure from the familiar oil cushioned journal employed in the small machines is occasioned by the speed reduction secured. The journal shells are babbitt lined and are split horizontally, the two halves being united by bolts with shim adjustment. Oil from a central system is introduced at the center under slight pressure, thoroughly flushing all parts. Axial adjustment is provided by metal shims arranged in quarter-box fashion. The diameter

of the shaft at the journal of a 5,000-k. w. machine is 15 inches, which is small in comparison with shafts required for a cross-compound reciprocating engine of corresponding capacity.

The two half shells are advanced in opposite directions by graduated set screws, so that the actual running clearances are measured in thousandths of an inch. Once set, these adjustments are permanent and do no require frequent "taking up."

Steam enters the turbine successively through an automatic quick closing throttle, hand throttle, strainer and the main admission valve. A circular steam port surrounding the entrance to the initial stage conveys this steam to all points so as to avoid stresses incident to more localized admission of highly superheated steam. The steam distribution system includes a by-pass valve which admits high pressure steam to

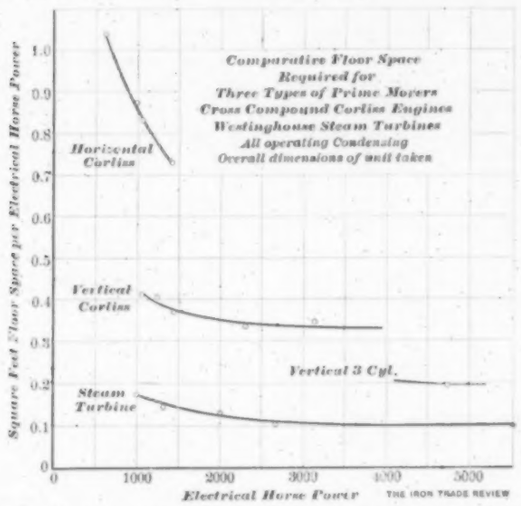


FIG. 2.—CHART SHOWING FLOOR STACE REQUIRED FOR DIFFERENT TYPES OF PRIME MOVERS.

the second stage of the turbine on overloads in order to increase its capacity, up to 50 percent in excess of full rated load. By properly proportionating the by-pass steam to the overload on the turbine maximum economy may be secured together with reserve overload capacity. This results in a slight rise in the economy curve on heavy overloads, resembling in some respects the engine economy curve on loads exceeding that of maximum economy. The turbine, however, only suffers in economy at heavy overloads while the engine economy decreases progressively from 75 to 80 percent of full load capacity.

The main admission valve consists of a double beat poppet valve operated by a small piston, this in turn being controlled by a small pilot valve directly actuated by the governor

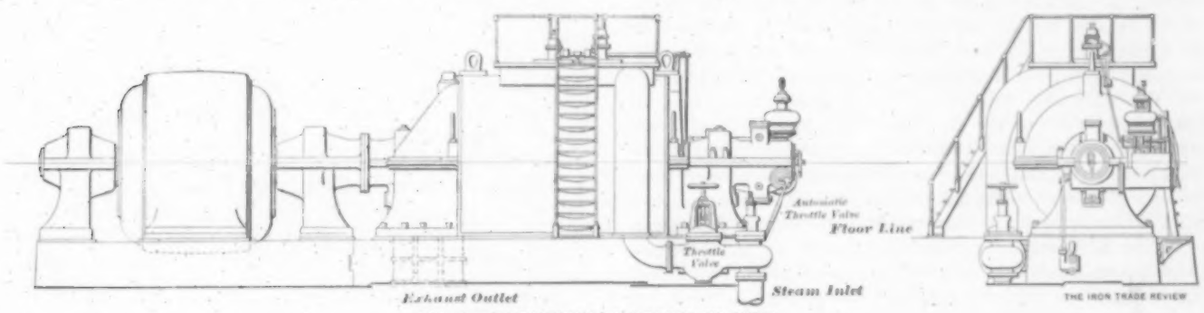


FIG. 3.—ELEVATIONS OF 5,000-K. W. UNIT.

mechanism. The valve admits steam to the turbine in puffs, the duration of which is proportioned by the governor to the load upon the turbine. This intermittent method obviates the throttling of steam to accommodate loading and secures the highest economy by using at all loads steam at boiler pressure. At the extreme outer end of the turbine shaft is mounted a worm driving a short horizontal cross shaft. This shaft drives at one end the oil pump and at the other end the governor through bevel gearing. An eccentric provides the reciprocating motion necessary for the valve mechanism.

The governor is of the fly-ball type, with 90 degree bell crank ball levers mounted on knife edges and fitted with roller contacts. The governor sleeve and spring is mounted on ball bearings and adjustment of the spring tension may be made while the turbine is running, affording convenient means for paralleling alternating current generators and dividing the load proportionately between them.

At the extreme end of the outboard pedestal is mounted an auxiliary speed limit governor. It is likewise of the centrifugal type and may be set to release, at any predeterimned speed, a small plunger valve which controls with high pressure steam the operation of the quick closing throttle before mentioned. This is normally held open by means of an overbalanced differential piston. At the moment the speed limit operates, the excess pressure is removed and the throttle closes. This device is employed purely for insuring absolute immunity from accident from excess speeds, due to the possible disablement of the governor mechanism.

Copious lubrication is supplied to all journals by means of a plunger pump driven from the worm shaft. The warm oil returning from the bearings passes through a copper coil cooler in the bedplate and thence to a reservoir from which the pump draws its supply. At no point is oil under high pressure employed for preventing erosion of rubbing parts, bearing areas being sufficient for supporting the weight of the rotating parts.

In general construction the 5,000-k. w. turbo-generators conform to those now building for smaller machines. The field or revolving element is built from a solid cylinder of steel slotted for the reception of the bar windings, and provided with ventilating openings corresponding with openings in the laminations of the stationary element. The generators may be wound for high voltage if desired, in order to avoid the use of step-up transformers in a system of power transmission at voltages ranging up to 15,000.

The 5,000-k. w. turbo-units here illustrated will be employed in heavy electric railway service, which is the most exacting encountered in central station operation. These machines will form the initial equipment of the Pennsylvania Railroad Terminal property in New York City, operating with electric locomotives the heaviest Pullman trains through the tunnel approaches to Manhattan. Three units will similarly inaugurate the power service on the Philadelphia Rapid Transit Subway system now under construction. Eight 5,000-k. w. units will furnish power to the London Subway system and three 3,500-k. w. units to the surface system of the same city. These units will operate under 175 pounds steam pressure, high vacuum and 100 to 175 degrees of superheat.

We have received some useful and attractive calendars from the following firms: J. F. Corlett & Co., Cleveland; Homer Bowes, Pittsburg; Philip Carey Mfg. Co., Lockland, O.; Geo. B. Sennett Co., Youngstown, O.; H. B. Underwood & Co., Philadelphia; J. W. Paxson Co., Philadelphia; the Simplex Time Recorder Co., Gardner, Mass.; Smooth-On Mfg. Co., Jersey City, N. J.; Cleveland Twist Drill Co., Cleveland; Albert Lorsch & Co., Maiden Lane, New York; Edwin R. Kent & Co., S. Canal street, Chicago; Bollinger & Rieley, Cleveland; F. E. Myers & Bro., Ashland, O.; Horton Mfg. Co., Painesville, O.; Allegheny Forging Co., Pittsburg; James V. Rose & Son, Sharon, Pa.; Belfont Iron Works Co., Ironton, O.; Manville Bros. Co., Waterbury, Conn.; Cleveland Pneumatic Tool Co., Cleveland; J. Gilmour, Bennett Bldg., New York; Republic Iron & Steel Co., Chicago; Werner Co., Akron, O.; Superior Charcoal Iron Co., Grand Rapids, Mich., National Electric Co., Milwaukee. Panel pictures have been received from the Northwestern Malleable Iron Co., of Milwaukee, and the Buffalo Foundry Co., of Buffalo, illustrating their respective plants. The latter is an exceptionally vivid view of the Buffalo foundry at night.

RECEIVER FOR THE CLAIRTON STEEL CO.

On application of the Crucible Steel Co. of America, receivers were appointed at Pittsburg Monday, Jan. 4, for the Clairton Steel Co., an underlying company. The following statement was given out by the Crucible Steel Co. of America:

"The Crucible Steel Co. of America has asked the United States Court to appoint a receiver for the Clairton Steel Co., and Judge Buffington this afternoon appointed the Union Trust Co., of Pittsburg, and William G. Park, as receivers of the Clairton Steel Co. The receivers have already given instructions for the continued operation of the plants of the company. The reason for taking this action was, that the officers of the Crucible Steel Co. of America were of the opinion that the Crucible Steel Co., in making further advances of money to the Clairton Steel Co., should be placed in the same position as any other person loaning money to the company, and should receive a security which would not be open to legal attack, and we felt that this could best be done by having the management of the company placed in the hands of receivers, and the moneys necessary to be advanced loaned under the protection of the orders of the court."

In the bill filed it is stated that the Clairton Steel Co. was formed in 1902 by the consolidation of the St. Clair Furnace Co. and the St. Clair Steel Co. The company has a floating indebtedness of about $4,500,000, much of which is now due and still more is rapidly maturing. The company has not been able to secure the capital needful to meet this indebtedness and carry on its operations, but assurance has been given that if a receiver is appointed so that the court can authorize the giving of proper security for the repayment of the moneys advanced, the Clairton company can obtain the funds necessary to enable it to continue operations and that by so doing it will be enabled to pay off its debts.

The plant of the Clairton Steel Co. at the new town of Clairton on the Monongahela river is of thoroughly modern construction, and was fully described and illustrated in *The Iron Trade Review* of Nov. 19. The company owns 115 acres of land there and has its own coal and ore. The plant as far as now completed contains three blast furnaces, 12 50-ton open hearth furnaces with blooming mills, billet mills, etc. The furnaces have made excellent records and have used large percentages of Mesabi ores. The steel plant was planned originally as a source of supply for the Crucible Steel Co. of America, but a considerably larger capacity than this required was provided in view of the economies of large tonnage, and it was expected that considerable steel would be sold in the open market. The steel works and blast furnace enterprise was undertaken when Reuben Miller was president of the Crucible Steel Co. Two companies were formed, as noted above. Bond issues of $3,000,000, as a guaranteed first mortgage 5 percent issue on the St. Clair furnaces, and $2,250,000, as a first mortgage on the St. Clair Steel Co., were made. In 1902 the two subsidiary companies were merged in the Clairton Steel Co., with $5,000,000 capital and with a first mortgage bond issue of $5,000,000, making a total bond issue for the subsidiary plants of the Crucible Steel Co. of $10,250,000. Part of the St. Clair Steel and Clairton Steel bonds are due this year. In addition to guaranteeing the bonds the Crucible company has advanced money from time to time to keep the steel plants in proper working order so that the Clairton company has become indebted to it to the extent of almost $4,500,000. It is estimated that between $15,000,000 and $16,000,000 has been expended on the Clairton works and that more will be necessary. Some time ago the Crucible company was reorganized, William G. Park was again secured as the executive head, the preferred dividend was passed on the report of insufficient earnings and a temporary loan, secured by the company's bonds, of $2,500,000 was made with prominent subscribers to the Crucible bonds.

W. P. Snyder is president of the Clairton company; F. B. Brown, vice president; George L. Brown, secretary; Julius Bieler, treasurer; W. G. Park, W. P. Snyder, F. B. Smith, J. H. Park and Reuben Miller, directors.

The Loretto Iron Co., Iron Mountain, Mich., in announcing a reduction in wages, also states that the rental of its houses will be reduced 25 percent.

Cincinnati Machinery Market.

CINCINNATI, Jan. 5.—The month of December was marked by some improvement in the demand for machine tools. This is quite general and while there has been no return to normal conditions there is enough improvement to be quite encouraging to the machine tool builders. The buying is widely distributed and the business is made up of foreign buying and orders from interior points. It has been a noticeable feature in the trade that the smaller manufacturers in the smaller localities have been the best customers of late. Automobile makers are also mentioned as among the steady buyers, while railroads are not so free with their orders as during the first half of 1903. Standard machines of medium sizes are having the most call, but a few large machines have been sold and some orders are noted for machines to put on special work. Reports from agents are more encouraging in the past month. The new year is being looked forward to with a hopeful feeling and there are enough orders now in sight to keep plants going for some time at about the present rate of operation. Prices are well maintained. The trade feels that machines must sell on merit and that price inducements would not help in any way to stimulate business.

The Cincinnati Planer Co. has had a good month in December. The company has taken on some foreign business including an order from Japan. It is running full time. Correspondence and pending orders make the outlook quite encouraging.

Schumacher & Boye report an improvement in orders and regard the outlook as much better. The December business was decidedly better than that of November.

The American Tool Works Co. has found business in the last three weeks better than expected. Prospects for the new year appear to be favorable. It has been customary to shut down the plant for 10 days during the holidays for repairs, etc., but this year the company has had to keep running part of the time and make all repairs as it went along. The plant will resume again on Monday in the regular way. A shipment is being made of a new 36-inch lathe with all geared head, motor driven, to the League Island Navy Yard. Other new tools are coming through, which are expected to find favor as soon as put on the market.

The Dreses Machine Tool Co. reports business quiet but still not dull to a discouraging degree. Foreign business is moderate and some orders from the interior towns make up the bulk of their trade at present.

The Cincinnati Milling Machine Co. regards the outlook for the new year as encouraging. Automobile manufacturers are still buying and there is more inquiry from railroads than in the recent past. Foreign trade is better and there is a more hopeful feeling in the trade.

Greaves, Klusman & Co. received orders in sufficient amount during December to start them going in the new year busily. Some export business is among the general run of buying.

The Lodge & Shipley Machine Tool Co. notes an improvement in trade, also more inquiry. Orders were better in December than in October or November. Reports from agents are more cheerful.

The John Septoe Shaper Co. had the best month in the year in December. The company has sold completely out of stock and reports the sale of 20 machines in one order to the Fairbank Co., of Philadelphia. Foreigh business is good and orders have been taken for Mexico and one for the Klondike.

Although the plant of the Illinois Steel Co. at Joliet is not in operation, hundreds of workmen are engaged in making extensive repairs. Every department is being thoroughly overhauled and the place is nearly as busy as it was when in full operation. It is hoped that the plant will be running before Feb. 1. No trouble is anticipated on account of the proposed reduction of wages. The new blast furnace No. 3 is to be in readiness to start by Jan. 15.

The Union Drawn Steel Co.'s plant at Beaver Falls, Pa., employing 300 men, resumed operations Jan. 2, and on Monday, Jan. 4, the American Ax & Tool Co. plant and the Myers Shovel Works at the same place started up.

A TREATISE ON KISH.

Rogers, Brown & Co. have sent out a leaflet under the title "Kish, Son of Carbon," which deals in an attractive and luminous way with this "degenerate son of a worthy sire." The writer says at the outset that "Kish," which means dirt, cannot be reformed and that the one thing to do is to prevent it. Since "Kish" is carbon out of place, the foundryman's problem is to keep the carbon where it belongs, as well as *as* it belongs. The leaflet goes on to say:

"Carbon is held in pig iron and cast iron in two conditions: in solution or combination like sugar in a custard pie, and in mechanical mixture like sawdust in a loaf of bread. In the former case it is knowu as combined carbon, in the latter as free or graphite carbon, which is the father of 'Kish.' It is generally said that silicon makes iron soft and sulphur makes iron hard. Quite the reverse. Silicon makes iron hard and brittle, sulphur makes iron soft and weak. When iron containing carbon is in a melted state the carbon is all in solution and is combined carbon. As the iron cools and hardens some of the carbon remains combined and some of it separates in more or less minute particles and is held in the pores of the iron as graphite carbon or gathers into larger pockets in the interior or on the surface of the casting and becomes 'Kish,' our friend the enemy.

"While silicon, acting on iron alone, makes it hard, acting on iron and carbon it causes the carbon to take the graphitic form and the graphitic carbon makes the iron soft and if there is enough carbon and enough silicon out comes 'Kish' and trouble. While sulphur makes iron soft, it causes carbon to combine with it, which makes it hard and if there is too much sulphur for the silicon the iron will be too hard and the other kind of trouble will be there. Of course the ideal condition would be to have just the right amount of carbon, silicon, sulphur, phosphorus and manganese in all the pig iron, but this condition is only brought about with difficulty and expense. We have to take the iron as it comes and make the best possible out of it.

"Sulphur is easy to dispose of. Manganese with limestone or oyster shells in the cupola will do it, but won't touch silicon. If iron is high in silicon and high in sulphur the two elements will, to a certain extent, neutralize one another in their effect on the carbon, but if the sulphur is removed by manganese and the iron is high in carbon the silicon is likely to remain too high, graphitic carbon too high and 'Kish' will be the result. A high manganese iron used with a high silicon, high sulphur iron should be lower in silicon than if the manganese were not present. If the sulphur is reduced in quantity the silicon must come down with it, and the reverse.

"The beginner in making up mixtures for the cupola should look more to the relative proportions of silicon and sulphur than to the total percentage of either, and when the proportion is right, be the totals high or low, it will do just as much harm to reduce the sulphur as to reduce the silicon. They must go up or down together. If 'kishy' irons are on hand and must be used, add some good, old-fashioned gray forge iron, low in silicon and higher in sulphur than ordinary foundry irons. The carbon will remain *where* it belongs and *as* it belongs and 'Kish' will not appear. A little experience will show just how much to use.

"There are other ways of producing the same result, but they are all more expensive except when scrap iron is relatively low in price and scrap is variable and uncertain. Above all things, the beginner should bear in mind that silicon and sulphur are to be considered with reference to their influence on the iron *by means of the carbon only*. Their effect on iron without carbon is a problem that the foundryman need not bother himself about."

Julian Kennedy, Sahlin & Co., Ltd., of 1 Arundel street, Strand, London, W. C., have received orders for complete plans and specifications for one of their combined universal cogging and plate-mills from Stora Kopparbergs Berslags Aktiebolag, Falun, Sweden. This mill has a wide range of work, being capable of rolling heavy slabs or blooms, tinplate bars, or small billets, universal plates up to 42 inches in width, and sheared plates to a width of 6 feet.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

Geo. W. Adams, care of the Forestry Manufacturing Co., Ellsworth, Ga., wants second-hand portable boiler and engine of from 10 to 18 h. p.

Anthracite Machinery & Supply Co., Allentown, Pa., will buy two 250-h. p. water-tube boilers, horizontal, with stack, all complete; also two 200-h. p. automatic engines, direct and belted type, complete; one heater, 300 to 500-h. p., either new or second-hand.

Clark & Hines, 849 Equitable building, Baltimore, Md., are in market for about fifty-six tons of 70-pound relaying rails.

The council of Cortland, O., has voted to accept the proposition of the Warren, Cortland & Jefferson Electric railroad for the location of its power house at Cortland. The plant will cost $150,000, and the town gives a site valued at $6,500.

The Shelby Foundry Co., Shelby, O., recently incorporated to manufacture light and heavy gray iron castings, brass and aluminum work, is operated by workmen who have had long experience in foundry work. The company has the following officers: Edward Hoffman, president; Geo. Kline, vice president; W. G. Brown, secretary and treasurer; William Wise, general manager.

Consumers' Can Co., 1015-1031 Fawn street, Baltimore, Md., wants 75-h. p. steam boiler and 50-h. p. engine.

J. C. Steele & Sons, Statesville, N. C., want to buy new or second-hand 80 to 100-h. p. boiler and 75 to 80-h. p. engine.

Eclipse Rolling Mill & Mfg. Co., 412 First National Bank building, Birmingham, Ala., is in market for two pairs of large Alligator shears, 1¼ Acme bolt header, one Bradley helve hammer, belting, pulleys, headers, scales, etc.

The Gustin-Bond Axle Co., Sullivan, Ind., has been incorporated with a capital of $25,000. Incorporators are: Gilbert Bond, M. R. Gustin, Wm. J. Hamilton.

The Richardson-Morgan Co., New York City, has been incorporated with a capital of $35,000 to manufacture furnaces, stoves and ranges. Directors are: M. A. Rourke, New York; L. J. Waterbury, Brooklyn; and E. R. Harding, Hillsdale, N. J.

The Automatic Hinge Co., Cleveland, O., has been incorporated with a capital of $25,000. Incorporators are: James C. Thompson, Peter W. Ward, Randolph C. Frey, Edwin C. Zuckreigel and Bernhard Sillig.

The Cleveland Foundry Supply Co., Cleveland, has been incorporated with a capital of $5,000. Incorporators are: Walter Rutson, W. J. Patterson, Sam Livingston, Harry Reisch and D. A. Doolittle.

The Robinson Automatic Machine Co., Detroit, has been organized for the purpose of manufacturing, buying and selling machinery. The capital is $50,000, all paid in, which includes the business of the Robinson Automatic Polishing Machine Co., 388 Milwaukee avenue. The stockholders of the new concern are: William V. Robinson, William A. Dwyer and John O. Campbell.

The Bancroft, Ross & Sinclair Co., Ltd., New Orleans, has been incorporated with a capital of $200,000 to manufacture sawmill and other machinery. Incorporators are: W. M. Bancroft, E. J. Ross, E. H. Easterling and J. A. Sinclair.

The Atwater Hardware & Machine Co., Atwater, Minn., has been incorporated with a capital of $50,000. Incorporators are: Martin Olson, George Feig, O. J. Gilberston, E. H. Toensing, S. S. Coell, G. A. Glader, C. F. Glader, S. B. Glader, Hans Dahl, Fred Stenberg, H. S. Nelson, F. L. Holm and P. O. Paulson.

The Western Improved Wire Fence Co., of the United States, has filed articles of incorporation at Helena, Mont. The headquarters are in Bozeman, Mont. The capital is $25,000, of which $7,500 is subscribed. The di-

rectors are: Bert B. Wood, Bozeman; Elmer J. Marks, Butte; and C. J. Bausch, Helena.

The John Perkyl Iron Works, Brooklyn, N. Y., have been incorporated with a capital of $50,000 to mold, cast and deal in iron. Incorporators are: John Perkyl, G. L. Schnepf and Robert J. Dobbin.

The American Steel Frame & Band Iron Co., New York City, has been incorporated with a capital of $10,000 to manufacture steel dress-suit case frames. Incorporators are: Harris Denzig, Isaac Kantrowitz and Louis Levin.

The W. H. Wilcox Co., Binghamton, N. Y., has been incorporated with a capital of $40,000 to manufacture machinery. Directors are: W. H. Wilcox, F. C. Wilcox and H. J. Mitchell, Binghamton.

The Atlantic Equipment Co., Schenectady, N. Y., has been incorporated with a capital of $25,000. It will repair and deal in machinery. Directors are: Leigh Best, C. B. Denny and C. E. Patterson, New York.

The North Star Mfg. Co., Minneapolis, Minn., has been incorporated with a capital of $20,000 to manufacture gasoline and gas engines. Incorporators are: Jerry G. Hoffken, George Stewart, Granville F. Prescott and William Furst, all of Minneapolis.

The Harrell Stamp Mill Co., El Paso, Tex., has been incorporated with a capital of $50,000, to manufacture mining machinery. J. J. Harrell is president and engineer in charge.

Henry Stengle and others at Wellsburg, W. Va., are organizing a company with a capital of $10,000 to establish a foundry and machine shop.

The Pittsburg Machinery & Gas Engine Co., of Pittsburg, has been organized with a capital of $10,000. The directors are, J. P. Koehler Sr., L. C. Koehler, Shaler township, Allegheny county; M. M. Tygard, Pittsburg.

The Empire Forge & Iron Co. has been incorporated at Buffalo, N. Y., with a capitalization of $5,000. The directors are Geo. W. Pfahl, Frederick Kraebel, Robert F. Kreinheder and Frederick G. Langner, of Buffalo; and Wm. Brennan Jr., of Sloan, N. Y.

Fires and Accidents:—

The engine manufacturing plant of the John Inglis Co., 14 Strachan avenue, Toronto, Ont., was damaged by fire to the extent of $40,000 Dec. 26. Loss was covered by insurance.

The Taunton Rivet Works, Taunton, Mass., were destroyed by fire Dec. 25. Loss about $25,000.

The Adam Steel & Wire Co.'s plant, of Joliet, Ill., was burned Dec. 27. Loss $35,000, insurance $13,000. The plant will be rebuilt.

The plate mill of the Glasgow Iron Co., Pottstown, Pa., was destroyed by fire a few days ago. Loss $30,000; partly insured. The mill was in full operation and employed about 100 men.

The power plant of the Piqua, O., works of the American Strawboard Co. was destroyed by fire Jan. 1. Loss $25,000; covered by insurance.

The plant of the Penn. Shovel Co., at Corry, Pa., was destroyed by fire Jan. 1. Loss $50,000; partly covered by insurance.

The plant of the Morning Star Thresher Co., Napoleon, O., was burned Jan. 1. Fire started in the foundry department. Loss $80,000 with $10,000 insurance.

The iron and brass foundry of James W. Carr, at Richmond, Va., was destroyed by fire a few days ago.

The machine and blacksmith shop at the Pioneer mine at Ely, Minn., was damaged by fire on Dec. 28 to the extent of $1,700, covered by insurance.

The round-house and machine shops of the Chattahoochee Valley railroad at Lanett, Ala., were destroyed by fire Dec. 26. Loss is $4,000, insurance $3,000.

The Chicago Steel Mfg. Co.'s plant at Hammond, Ind., was burned Dec. 30. Loss $75,000, fully covered by insurance. The plant was shut down Dec. 12 and expected to re-open Jan. 4, employing 300 men.

The Tennessee Central railroad shops, Nashville, Tenn., burned on the night of Dec. 31, causing a loss estimated at $320,000. The boiler shops, planing mill, blacksmith shop, roundhouse, machine shops, storeroom and office were consumed, and four locomotives, one combination and four box cars were destroyed.

New Construction:—

The Aultman & Taylor Machinery Co., Mansfield, O., advises us that the recent fire in its foundry took place in a part which, during the time of rebuilding, will not interfere greatly with other work. The company is now tearing down the ruins and expects to rebuild at once, simply replacing the part which was destroyed. The loss, which was covered by insurance, has been adjusted.

Edward Renneberg & Son, Baltimore, will erect a machine shop 125 x 40 feet and an engine-house 50 x 30 feet, of brick and steel, with concrete floors.

J. W. Gresham, Griffin, N. C., manufacturer of buggy bodies, will erect a foundry at a cost of $5,000.

Work has been commenced on the construction of the new foundry at the Puget Sound navy yard. The building, which will cost $69,000, will be erected by the Congress Construction Co., of Chicago. It is expected that the plant will be in operation in about seven months.

The skeleton of the plant of the Sweets Steel Co., at Newberry, Pa., has been erected and indications point to the completion of the entire work by next spring. The frame building to be used as a machine shop is practicably finished. This will be the only frame building of the plant; the others will be of metal and brick. Within a few days the laying of the brick will be begun on the buildings whose frames have been finished, and work will be prosecuted all winter.

The recent fire at the plant of the Henry McShane Mfg. Co., Baltimore, resulted in the loss of only a warehouse in one of the departments, that of the iron and enameling plant, and none of the manufacturing departments was affected. No action has been taken, as yet, by the receiver in regard to rebuilding.

The Southern Foundry Co., Dallas, Texas, recently incorporated, has leased a plant and is now operating it. The company does not contemplate building at once, but expects to do so before the end of this year.

Work is progressing as rapidly as the weather will permit on the new plant of the Railway Steel Spring Co., at Oswego, N. Y. The new buildings will cost $75,000 and the company will spend almost an equal amount on equipment. The main building is 340 x 215 feet, and it has been built directly over and around the original plant without interrupting the operation.

Richardson & Goddard are building a new boiler shop, 53 x 140, at Mobile, Ala.

The National Iron Co., a St. Louis manufacturing concern, has commenced the erection of a plant at East St. Louis, Ill., adjoining the St. Louis Locomotive Works plant. The new plant will manufacture small castings.

The Otto Gas Engine Works contemplate erecting a new plant at Thirty-third and Walnut streets, Philadelphia.

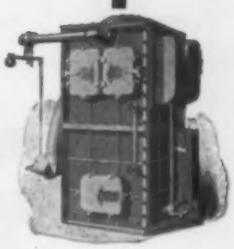
The Brooks Works of the American Locomotive Co., Dunkirk, N. Y., are completing a number of recent improvements, including the installation of a compound, direct-connected, Brown-Corliss engine of 800 h. p., and a 500-k. w. generator of General Electric type. A number of new motors will be installed at once, greatly increasing the shop capacity. A new wheel shop, 120 x 225 feet, is nearing completion. This is thoroughly up-to-date, the equipment including a number of electric traveling cranes, a 101-inch driving wheel lathe, and a new quartering machine. The floors are of tar concrete. All departments of the works are running full and orders for many months ahead are reported.

The Centaur Motor Co., Buffalo, is erecting a 2-story brick plant and storage building on Franklin street, that city.

It is reported that Lackawanna Steel Co., Buffalo, is about to make some large shipments of rails to Mexico—about 30,000 tons in all.

COCHRANE FEED-WATER HEATERS

Is Your Feed Supply Good?



Any man who has exhaust steam going to the atmosphere, who is not provided with a heater, must be quite indifferent to the end which the rest of us are hustling to attain; i. e., having our plants run as economically as possible. Ever hear the old saying, "A dollar saved is a dollar earned?" Anywhere from 15 per cent to 25 per cent of fuel can be saved by the use of a **Cochrane Heater.**

Not only will these Heaters give the highest possible temperature attainable with exhaust steam at atmospheric pressure, but they will give **REAL PURIFICATION** to any boiler feed supply, no matter how bad. When water is turned into steam within a boiler, what happens if there is mud in this water? The solid particles are certainly not evaporated — what becomes of them? Some are worked out through the blow-off, the rest settle in different parts of the boiler. The lime, magnesia and other chemical impurities act as a cement, binding together the insoluble matter, and scale is formed — hard or soft, according to amount of baking.

The difficulty of removing scale, the cost of doing it, and the losses occasioned through the heat given out by the coal being unable to quickly and readily pass through this insulating stuff are well known. **If you are interested, write us.**

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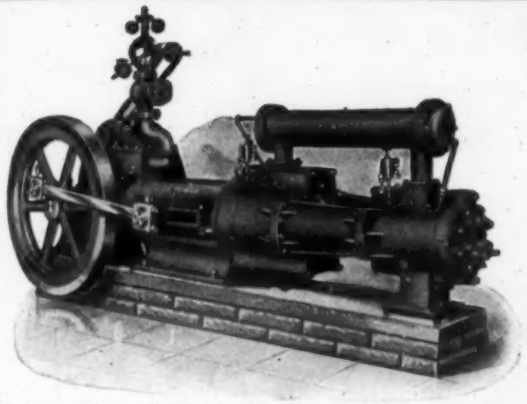
Manufacturers of Cochrane Feed Water Heaters, Cochrane Steam and Oil Separators, and the Sorge-Cochrane Systems.



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Sloss-Sheffield Steel and Iron Company

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A. S. Leath, Southern Sales Agent	Birmingham, Ala.
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Hugh W. Adams, 85 Water Street	Boston, Mass.
J. K. Dimmick & Co., Drexel Building	Philadelphia, Pa.
J. K. Dimmick & Co., Murtland Building	Pittsburg, Pa.
J. K. Dimmick & Co., Ellicott Square	Buffalo, N. Y.
Robert Field, 1105 Traction Building	Cincinnati, O.
William Wieman, 606 Citizens Bank Building	Cleveland, O.
E. C. Smith, 508 Commonwealth Trust Building	St. Louis, Mo.
David Evans, 1030 Monadnock Block	Chicago, Ill.
W. H. Palmer, Pioneer Press Building	St. Paul, Minn.
Zimmerman-Wells-Brown Co., 2d and Ash Streets	Portland, Ore.
Hardy Greenwood, P. O. Box 751	San Antonio, Tex.
T. R. Hassam, 1 Calle de las Damas 5	Mexico City
F. S. Walshe, 325 Carondelet Street	New Orleans, La.
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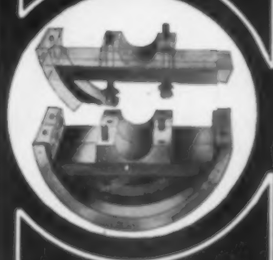

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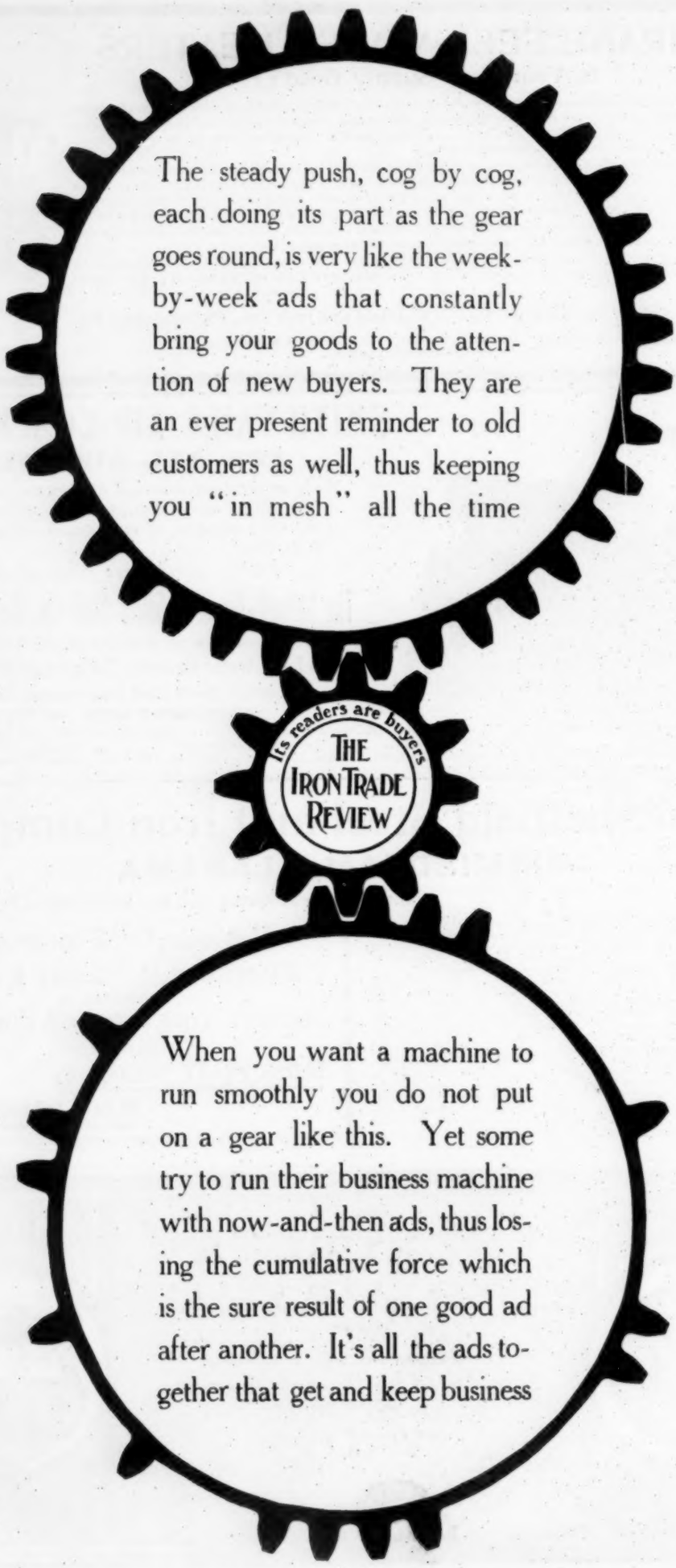
The steady push, cog by cog, each doing its part as the gear goes round, is very like the week-by-week ads that constantly bring your goods to the attention of new buyers. They are an ever present reminder to old customers as well, thus keeping you "in mesh" all the time
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